

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)		2. REPORT DATE		3. REPORT TYPE AND DATES COVERED Final 1 May 98 to 29 August 00	
4. TITLE AND SUBTITLE Validity of Outside-Issue Questions in the Control Question Test				5. FUNDING NUMBERS N00014-98-1-0725	
6. AUTHORS Charles R.Honts, Ph. D. Susan Amato, Ph. D. Anne Gordon, Ph. D.					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Boise State University Department of Psychology / Applied Cognition Research Institute 1910 University Drive Boise, Idaho 83725				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) ONR / ONR 252: Brian D. Glance DoDPI Ballston Centre Tower One 800 N. Quincy St. Arlington, VA 22217-5660				10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES					
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release: distribueion is Unlimited				12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The impact of a more serious undiscovered crime on the validity of a polygraph test concerning a lesser crime and the utility of specialized outside issue questions to detect the undiscovered crime, was explored in a mock-crime experiment. Comparison question polygraph tests concerning the theft of \$1 were given to 192 participants, half of whom had stolen the \$1. However, in addition, half the participants also stole \$20, and they were told that they could keep the \$20 on passing the polygraph concerning the \$1. The primary finding was a large significant interaction of Guilt (concerning the \$1) and Outside Issue (stealing the \$20). Further analyses revealed that contrary to accepted lore in the polygraph profession, the outside issue had its primary effect on the Innocent, moving their scores more than a standard deviation in direction of deception. These results suggest that end users of polygraph examinations should have greater confidence in truthful than in deceptive outcomes. The outside issue questions were not able to detect the presence of an outside issue. Field polygraph examiners should not rely on outside issue questions to detect the presence or absence of outside issues concerning their polygraph subjects.					
14. SUBJECT TERMS Polygraph Polygraph Outside Issues and Errors Polygraph Scoring Methods				15. NUMBER OF PAGES	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL		

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)  
Prescribed by ANSI Std. Z39-1  
298-102

2 0000426 051

Boise State University  
1910 University Drive  
Boise, Idaho 83725  
Phone 208.426.3695  
Fax 208.426.4386

The Applied Cognition Research Institute

# Validity of Outside-Issue Questions in the Control Question Test

*Final Report on Grant No. N00014-98-1-0725*

•  •

*Charles R. Honts, Ph. D.*

*Susan Amato, Ph. D.*

Co-Principal Investigators

*Anne Gordon, Ph. D.*

Post-Doctoral Associate

*April 21, 2000*

20000426 051

.....

# Validity of Outside-Issue Questions in the Control Question Test

## *Executive Summary*

We conducted a laboratory mock-crime experiment to examine the effects of the presence of a significant outside issue on polygraph outcomes (guilt vs. innocence) and to explore the validity and utility of including outside-issue (symptomatic) questions in the Department of Defense's Zone Comparison Test. The principle concern within the polygraph profession has been that outside issues would lead to false negative outcomes for guilty subjects. Outside issue questions are designed to detect the presence of outside issues. Although outside-issue questions are common in the polygraph profession and in current Federal practice, little research has been devoted to the topic. Subjects in this study were either innocent or guilty of committing a mock-crime of theft (\$1), and were given a comparison question test regarding that theft. In addition, subjects were either guilty or innocent of a second mock-crime theft (\$20) about which they were neither questioned nor tested. Finally, subjects were or were not asked the standard Federal outside issues during their polygraph examinations. The primary results and implications of this study are:

1. Outside issues had a significant and dramatic impact on the validity of the comparison question tests given in this study. However, the impact was not in the direction predicted by the polygraph profession.
  - 1.1. Subjects guilty of stealing one dollar were minimally affected by the secondary theft of the twenty dollars.
  - 1.2. Subjects innocent of stealing one dollar were substantially effected by the secondary theft of the twenty dollars, even though they were never questioned nor tested about the twenty dollar theft.
  - 1.3. For the DoDPI evaluators, discrimination between innocent and guilty subjects went to chance levels when the outside issue was present.
2. The use of outside issue questions was not shown to have utility or validity for detecting or ameliorating the effects of outside issues.

- 2.1. DoDPI evaluators were unreliable in their judgments about outside issue presence and they were unable to detect the presence of outside issues at better than chance levels.
- 2.2. Statistical analyses of the physiological data suggest that there is little useful information in the reactions to outside issue questions. Therefore, there is little reason to think that current field practice could be modified to improve the detection of outside issues via the current outside issue questions.
3. Outside issue questions were shown to function as valid comparison questions. However, they were consistently weaker, although not strongly so, than were the traditional comparison questions.
4. A comparison of the Utah method of scoring polygraph data (evaluation of charts from the computer screen, scoring of the plethysmograph, and use of the Utah scoring system) was shown to be significantly more accurate than the methods currently employed by the DoDPI (scoring from paper charts, not scoring the plethysmograph, and use of the DoDPI scoring rules).

.....

# Validity of Outside-Issue Questions in the Control Question Test

## Background

Polygraph tests play an important role in the Personnel Security Programs of the Department of Defense and other United States government agencies. Virtually all federal agencies concerned with either national security or with law enforcement use psychophysiological detection of deception examinations to meet their respective missions. Many, if not most, of those agencies use polygraph tests for personnel security screening, both before hiring and during employment. Polygraph tests also play an important role in federal law enforcement. Polygraph tests are frequently used in the investigation of criminal cases and recent court decisions suggest that the results of polygraph tests may be admissible in criminal proceedings (e. g., *United States v. Cordoba*, 1997; *United States v. Scheffer*, 1996). Any practice that serves to enhance the validity of polygraph examinations would thus be of benefit to those federal agencies that make use of such tests. Conversely, any practice that reduces the validity of polygraph examinations would be detrimental, and should be eliminated.

One common practice in the polygraph profession is the use of outside-issue (symptomatic) questions (Backster, 1976; Capps, Knill & Evans, 1993). Outside issue questions are 1 or 2 questions included in the question sequence in order to assess the subject's concern with outside issues. The rationale behind the outside-issue is as follows (Hess, 1976): The subject of a polygraph test may, or may not, be attempting deception concerning the issue of the current examination. However, at the same time the subject may be as concerned or even more concerned that the examiner may discover his or her involvement in a more serious crime that is not currently the topic of the polygraph examination. Since the subject has focused her or his attention (psychological set) on the outside issue and on not on the relevant or control questions of the current examination, he or she may fail to respond appropriately and an error or inconclusive test result might occur. Backster reported a reduction in the inconclusive rate for innocent subjects with the use of outside-issue questions (Backster 1976). Unfortunately, Backster has never published the data to support such an assertion.

The use of the outside-issue question in actual practice varies widely (Capps et al., 1993). As originally developed by Backster, the outside-issue was not used in the numerical scoring (Hess, 1976). The outside-issue questions were examined after one presentation of the question series. If the examiner observed that the subjects' responses were confined to the outside-issue questions and not to either the relevant or comparison questions of the examination, the examiner attempted to reassure the subject that the scope of the present examination was limited to only those questions and issues that had been reviewed. An implicit assumption of the Backster approach was that this intervention would alleviate the outside issue problem and that the examination could proceed in a standard manner.

An outside-issue question was included in all of the studies conducted by the Utah Cooperative Working Group during the 1980s and early '90s (Honts, Hodes, & Raskin, 1988; Honts, Raskin, & Kircher, 1987; Honts & Raskin, 1988; Kircher & Raskin, 1988, Honts, Raskin, & Kircher, 1994; Horowitz, Kircher, Honts, & Raskin, 1997). In all of these studies the outside-issue question was asked in first position on all charts and was never used in evaluation. Its inclusion followed from the same logic as that described above for Backster, but those propositions were never examined experimentally or statistically.

Capps et al. (1993) report a variety of different approaches concerning the use of outside-issue questions in the U.S. Federal practice. They report that the Army Criminal Investigations Division has used the outside-issue in scoring one zone. If the response to the outside-issue in that zone was greater than the response to either the relevant or the control questions, no score was assigned. Capps et al. (1993) also report that the Naval Investigative Service has used the outside-issue question in their test as a comparison question. If the response to the outside-issue question was greater than the relevant question in that zone of comparison, a positive score was assigned at the zone.

The Department of Defense Polygraph Institute (DODPI, 1997) includes two outside-issue questions in its Zone Comparison Test (ZCT). The two examples given in the DODPI teaching handout are:

**#3 Do you believe I will only ask you the questions we reviewed? YES**

**#8 Is there something else you are afraid I will ask you a question about? NO**

To our knowledge, virtually no research has been conducted on the effects of including outside-issue questions in a comparison question test. The one published study that we were able to find examined the inconclusive rates of unconfirmed field cases that either did or did not include outside-issue questions. Capps et al. (1993) reported that the inclusion of outside-issue questions was significantly associated with a reduction in the number of inconclusive outcomes. We reanalyzed the Capps et al. data and discovered that although the association of the use of outside-issue questions with inconclusive outcomes was statistically significant, it was small in magnitude,  $\Phi = .173$ ,  $p = .034$ ,  $r = .173$ ,  $p = .034$ . Thus the inclusion of outside-issue

questions was predictive of about 3% of the variability in conclusive versus inconclusive decisions.

Since the use of outside-issue questions is widespread with Federal Polygraph practice, it is wise to conduct some tightly controlled experimentation to explore their effects. The present research was conducted for such a purpose.

### **Relationship of the Proposed Research to Personnel Security Issues**

If Outside-Issue Questions perform as designed, then the validity of polygraph tests used in personnel security would be enhanced. If the findings of this study suggest that they do not add to the validity of polygraph tests, their inclusion would be unwarranted and the practice should be abandoned. Thus, this research addressed the following questions:

1. Does the presence of an untested outside issue effect the validity of a control question test of the tested issue? If there are effects, do they differentially affect innocent and guilty subjects.
2. Do the outside-issue questions as used by DODPI detect the existence of outside issues?
3. Does the inclusion of outside-issue questions improve the accuracy of decisions in the absence of a modification of the scoring system?
4. Is there a way to improve the accuracy of polygraph testing by including the outside issue questions in a formal manner?
5. Can outside-issue questions function as valid comparison questions?

## Method

Participants. One hundred and ninety two individuals (111 female, 81 male) were recruited via help-wanted ads (see Appendix A), which stipulated an hourly wage of \$15 for approximately 2 1/2 hours of participation in a polygraph research study. Individuals who were currently taking prescription medication for high blood pressure, a heart condition, or to treat a psychological disorder or had previously taken a polygraph examination were deemed ineligible for participation in the study (see Appendix B). Those who met the selection criteria were randomly assigned to one of eight experimental conditions. Participants ranged in age from 18 to 65 (*Mode* = 20, *M* = 30, *SD* = 10.5). Approximately 3.5% of participants had less than 12 years of formal education; 12% had a high school diploma or equivalent; 29.8% were currently enrolled in college; 2.1% had an associate's degree; 15.6% had a bachelor's degree, and 1% held a post-graduate degree.

Examiners. An experienced polygraph examiner used reference materials provided by the Department of Defense Polygraph Institute to train three women, none of whom was a practicing polygraph examiner, to conduct polygraph examinations. Two of the examiners held the Ph. D. degree in Psychology, the third was an undergraduate research assistant. The goal of the training was that the examinations should follow field procedures as closely as possible. The polygraph examiner and the assistants who greeted the participants were unaware, at all times, of the participants' assignment to conditions. The only exception to this pattern occurred when the polygrapher learned, based on the participant's identification number, whether or not she was to ask the outside issue question during the examination.

Apparatus. Physiological data were collected with a CPSLab unit. The following physiological responses were monitored: Thoracic and abdominal respiration were monitored with strain gauges; electrodermal response was measured from Ag/AgCl electrodes placed on the distal surface of the subjects ring and index fingers of the right hand; relative blood pressure was monitored from a cuff placed on the subjects upper left arm; and peripheral blood flow was monitored with a photoelectric plethysmograph placed on the distal surface of the subject's right thumb. Instrumentation filtering and sampling was modeled after field instrumentation procedures as closely as possible given the constraints of the equipment.

Design. The design of the study was a 2 (Guilty, Innocent) X 2 (Outside Issue Present, Absent) X 2 (Outside Issue Question Present, Absent) between-subjects factorial. Subjects were randomly assigned to eight conditions with the constraint that each condition would be considered to be complete when 24 subjects had been run in that condition.

Procedures. The design was implemented using of a variation of the mock-crime paradigm developed at the University of Utah (e.g., Podlesny & Raskin, 1978). Upon arriving at the Applied Cognition Research Institute, participants were directed to a room in which they privately watched a video (the script of which was also presented in typewritten form; see Appendix C). This

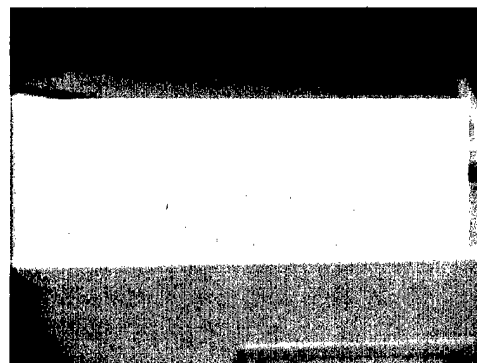


script/video described that their participation in the study may involve stealing some money and that they, regardless of their assigned condition, would be taking a polygraph examination during which they were to try to convince a polygraph examiner that they were giving truthful responses to the questions. If they agreed to the described conditions of the study, participants signed an informed consent sheet (see Appendix D). After their consent was obtained, participants received a sealed envelope, selected blindly by the research assistant, that contained instructions for watching another video (or two videos) that would describe their condition assignment and instructions for carrying out their task(s).



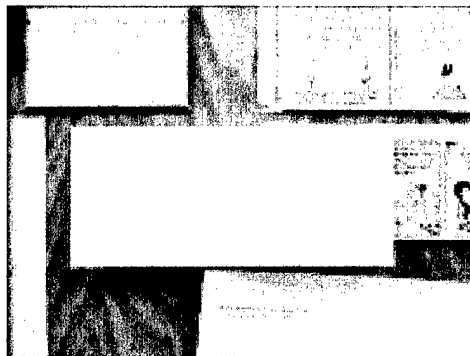
Some participants (Innocent) were shown a video informing them that they were assigned to the innocent condition and thus they were not going to be stealing any money during the study. These participants were told that they would be paid a \$1 bonus if they successfully convinced the polygraph examiner that they were innocent of stealing \$1 from the Education Building (see Appendices E and F). These participants were instructed to leave the laboratory building and go to the Education Building (that houses the Psychology Department), where they were to deliver an envelope to the door of Dr. Honts' office and return to the laboratory 20 minutes later to take a polygraph examination (see Appendix G).

Half of the Innocent participants (Outside Issue Present) were shown a second video that informed them that they had also been assigned to a condition in which they were going to steal \$20 from a file cabinet in Room 620 in the Education Building during the study and subsequently take a polygraph examination concerning a theft of \$1, a crime that they did not commit. Outside Issue Present participants expected there to be people present in Room 640 during the attempted theft. These participants were told that they would be paid a \$20 bonus if successful in convincing the polygraph examiner that they were innocent of stealing \$1 from the Education Building. (see Appendix H and Appendix I). These participants were instructed to leave the laboratory building and go to the Education Building, where they were asked to steal an envelope labeled "Jennie Wilkenson's Psychology Club Dues" from a file cabinet in Room 640 and, after leaving this room, to open the envelope and hide its contents (\$20) on their person (see Appendix J). These participants were forewarned that Room 640 was a study room for students, and that there would likely be people present (a confederate



always was present) during the theft. Participants were instructed that if they were asked by anyone what they were doing (the confederate always did ask), that they should say that they were the Treasurer of Psi Chi and that they were there to pick up the Psi Chi dues

Other participants watched a video that informed them that they were



assigned to the guilty condition and thus they were going to be stealing \$1 during the study. These participants were also informed that if they were successful in passing the polygraph examination, by producing a truthful outcome concerning the theft of \$1 from the Education Building, they would be paid a \$1 bonus (see Appendices K and L). These participants were instructed to leave the laboratory building and go to the Education Building. They were asked to find Dr. Honts' office and steal an envelope

addressed to Sam Stone that was taped to the door. They were asked to open the envelope and hide its contents (a \$1 bill) on their person. They were asked to return to the laboratory 20 minutes later to take a polygraph examination (see Appendix M).

Half of the subjects that were assigned to steal \$1 were additionally instructed, via a second videotaped message (Outside Issue Present, see Appendix N), to steal another envelope that contained \$20. Participants who committed this outside issue crime were told that they would be paid a \$21 bonus if they could pass the polygraph examination regarding the theft of \$1. These participants were instructed to go to the Psychology Department and, after stealing the envelope from Dr. Honts' door, to enter Room 640, go to the file cabinet, open the top drawer, and steal an envelope labeled "Jennie Wilkenson's Dues." These participants were instructed to then leave Room 640, open the envelope and hide its contents (\$20) on their person. These participants were forewarned that Room 640 was a study room for students, and that there would likely be people present (a confederate always was present) during the theft. Participants were instructed that if they were asked by anyone what they were doing (the confederate always did ask), that they should say that they were the Treasurer of Psi Chi and that they were there to pick up the Psi Chi dues (see Appendix O).

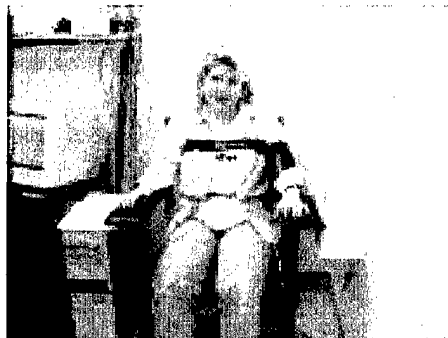
Upon returning to the laboratory, an assistant introduced the participants to the polygraph examiner. Participants were reminded by the examiner that their polygraph examination would be videotaped and that the purpose of the examination was to identify the person who had stolen an envelope containing \$1 from the door of Dr. Honts' office in the Education Building earlier that day. Examination sessions began with the examiner collecting some general



information from the participant concerning things such as the participant's general health, how well they had slept the night before, whether he/she had ever taken a polygraph exam, etc. (see Appendix P). Participants were then told that they were a suspect in the theft of \$1 from the Education Building and were asked if they had, in fact, stolen the envelope containing the money. After participants denied the accusation, the examiner asked them to explain where they had been and what they had been doing for approximately the last two hours.

At this point, the examiner briefly discussed the nature of the autonomic nervous system (e.g., that although individuals are largely able to control their motor behavior, many functions of the body, such as temperature regulation, heart rate, and breathing are largely uncontrollable and vary automatically in response to physical and psychological stressors, such as lying). Next, the function of each sensor was described to participants, and participants were told to expect that, due to the pressure applied from the blood pressure cuff, they might experience a tingling sensation in and/or some discoloration of the arm on which the blood pressure cuff was placed. At this point, participants were asked to sign another informed consent sheet (see Appendix Q).

Next, participants were told that a practice test was going to be conducted before the actual polygraph examination concerning the theft. The practice test was introduced under the guise of being necessary for establishing participants' unique physiological reactions to lying. Participants were told to pick a number between 2 and 6 and inform the examiner of the number that was chosen. It was explained that after the sensors were attached to the participant a series of questions would be posed, beginning with "Concerning the number that you chose, was it the number 1?" and continuing through to number 7. Participants were instructed to answer "no" to each of the seven questions, so that during the asking of the question regarding the number that was selected (and hence their deception was known) their unique physiological responses to lying could be identified.



Participants were asked to wash their hands (so that the best possible recordings from the sensors could be obtained). At this point, the sensors were attached, and the practice test was conducted. All participants were told that the polygraph revealed a highly distinct change in their physiological responses on the question to which they lied. Hence, the participant was ideally suited for the study.

Next, each of the questions that would be asked during the polygraph examination concerning the theft of \$1 was reviewed with the participants. As the examiner read each question, the participant was instructed to answer with a "yes" or "no" just as they would during the actual examination. All participants were asked 3 relevant questions, 3 control questions, and 2 neutral questions (see Appendix R). In addition, participants who were assigned to the

outside-issue question conditions were asked 2 outside-issue questions (see Appendix S). After all of the questions were reviewed and responded to by the participants, a comparison question test was conducted according to standard procedures used by the U. S. Federal polygraph examiners.



After the examination was completed, participants received a thorough debriefing by an assistant, during which they were told about the outcome of their examination (i.e., whether their responses were scored as truthful or deceptive) and the various conditions that were being compared as part of the study. Also during the debriefing, participants were asked about their occupation, the highest obtained level of education they had completed, and to describe any countermeasures that they used during the polygraph examinations (See Appendix T). Finally, participants were thanked and paid (Mode = \$30.00) for their participation.

The resulting physiological data were evaluated independently by an experienced polygraph examiner at the Applied Cognition Research Institute. That examiner used the numerical scoring system developed and validated at the University of Utah (Bell, Raskin, Honts, & Kircher, 1999). The Utah evaluator scored the polygraph charts from a computer screen using the Computerized Polygraph System Software v. 3.00 (CPS; Kircher & Raskin, 1999).



The data from the study were sent to DoDPI and were evaluated by three DoDPI instructors using the scoring system taught at DoDPI. Initially we wanted the instructors to score the data from the computer screen. If they had done so we would have been able to make a direct comparison between the efficacy of the Utah scoring systems and the DoDPI scoring systems. However, the DoDPI examiners claimed to be unable to score polygraph charts from the computer screen. Moreover, they claimed to be ignorant of the finger pulse amplitude measure, and said that they could not score that measure. These positions were a great surprise to us because evaluation of data from the screen is and has been the scientific standard for at least a decade. This also posed a practical problem because when CPS data are printed they are formatted so that the channels do not overlap. If there are large tonic changes in a measure over the course of a recording window, then when printed the amplitude of the phasic changes on the chart may appear quite small. This is not a problem if the data are scored from the screen as the evaluator has complete control over the scaling and time course displayed on the monitor. The DoDPI position on

finger pulse amplitude was particularly puzzling to use as finger pulse amplitude is a standard measure and scoring rules for finger pulse amplitude have existed in the Utah system for more than twenty years. Finger pulse transducers have been available on field polygraph instruments since at least the 1970s.

In any event, after long negotiation, it was agreed that DoDPI would print the data and score the data from paper charts. Additionally, the DoDPI evaluators did not score the finger pulse amplitude measure. These outcomes were unfortunate since they confound any comparison of the two scoring systems.

## Results

### NUMERICAL SCORES

#### Nuisance Variables

Initial analyses of the numerical scores were conducted on two nuisance variables, sex of the subject and identity of the polygraph examiner. Sex and Examiner were included as independent variables in a Sex (2) X Examiner (3) X Guilt (2) X Outside Issue (2) by Outside Issue Question (2) ANOVA. Neither of the main effects nor any of the interactions involving Sex or Examiner produced a significant results. Sex and Examiner are not considered further in this report.

#### Reliability of Numerical Scoring

Numerical scores were obtained for all subjects from three DoDPI instructors who did an independent evaluation of the physiological data (herein referred to as DPIa, DPIb, and DPIc). Total scores and total component scores were calculated for each evaluator and those scores were intercorrelated. Inter-rater correlations for respiration, electrodermal (EDR), relative blood pressure (RBP), and total numerical scores are shown in Table 1. Since the Boise State University independent evaluator used the Utah Scoring System (USS) and not the DoDPI system, his data were not included in the reliability analysis.

**Table 1. Inter-rater Correlations for the DoDPI Evaluators**

Component		A with B	A with C	B with C
Respiration	<i>r</i>	0.457	0.215	0.204
	<i>p</i>	0	0.003	0.004
	<i>N</i>	192	192	192
EDR	<i>r</i>	0.946	0.907	0.922
	<i>p</i>	0	0	0
	<i>N</i>	192	192	192
RBP	<i>r</i>	0.705	0.586	0.513
	<i>p</i>	0	0	0
	<i>N</i>	192	192	192
Total Score	<i>r</i>	0.897	0.839	0.839
	<i>p</i>	0	0	0
	<i>N</i>	192	192	192

All inter-reliability values were significant,  $p < .05$ . However, values for RBP and especially for respiration are very modest in magnitude. In particular, the values for respiration suggest that the DoDPI scoring system is not very reliable for that component and is in need of modification. This is

particularly true in contrast to the Utah Scoring System where values in the 0.7 range are usually obtained.

### Effects of the Independent Variables on Numerical Scores

In order to test the basic power of our mock-crime scenario and the basic validity of the scoring methods used to evaluate the resultant physiological data some initial validity analyses were conducted. Component and total numerical scores from those innocent and guilty subjects who did not experience the outside issue manipulation (who did not steal the \$20.00) were correlated with the guilty/innocence criterion. Results of those analyses are presented in Table 2. In absolute terms, the USS outperformed the DoDPI scoring system for every component except EDR. In respiration, the advantage of the USS over the DoDPI system was very large.

**Table 2. Correlations with the Criterion.**

Component		DPIa	DPIb	DPIc	BSU
Respiration	<i>r</i>	0.289	0.325	0.212	0.576
	<i>p</i>	0.004	0.001	0.038	0.000
	<i>N</i>	96	96	96	96
EDR	<i>r</i>	0.595	0.641	0.629	0.621
	<i>p</i>	0.000	0.000	0.000	0.000
	<i>N</i>	96	96	96	96
RBP	<i>r</i>	0.386	0.400	0.333	0.510
	<i>p</i>	0.000	0.000	0.001	0.000
	<i>N</i>	96	96	96	96
Finger Pulse	<i>r</i>				0.510
	<i>p</i>				0.000
	<i>N</i>				96
Total Score	<i>r</i>	0.625	0.611	0.638	0.718
	<i>p</i>	0.000	0.000	0.000	0.000
	<i>N</i>	96	96	96	96

A test of the significance of the effects of the independent variables in this study on total numerical scores was conducted using a repeated-measures ANOVA. That analysis included the four Evaluators as a repeated measures factor and Guilt (did or did not steal the \$1), Outside Issue (OI, did or did not steal the \$20) and Outside Issue Question (OIQ, was or was not asked the outside issue questions) as between subjects factors. The means for this analysis are shown in Tables 3A, B, C, and D.

**Table 3. Means and Standard Deviations for the Total Numerical Scores for the Four Numerical Evaluations.**

Table 3A: Total Numerical Scores Based on the Utah Scoring System

Evaluator	Guilt	Outside Issue	OI Question	Mean	Std. Dev.	N
Utah	Innocent	Absent	NotAsked	10.79	12.36	24
			Asked	14.96	12.72	24
			Total	12.87	12.58	48
		Present	NotAsked	-3.12	12.17	24
			Asked	-2.71	9.90	24
			Total	-2.92	10.97	48
		Total	NotAsked	3.83	14.02	48
			Asked	6.13	14.38	48
			Total	4.98	14.17	96
	Guilty	Absent	NotAsked	-7.58	11.27	24
			Asked	-14.53	9.22	24
			Total	-11.06	10.77	48
		Present	NotAsked	-10.04	11.38	24
			Asked	-9.42	9.54	24
			Total	-9.73	10.39	48
		Total	NotAsked	-8.81	11.28	48
			Asked	-11.98	9.63	48
			Total	-10.39	10.55	96
	Total	Absent	NotAsked	1.60	14.94	48
			Asked	0.21	18.51	48
			Total	0.91	16.75	96
		Present	NotAsked	-6.58	12.17	48
			Asked	-6.06	10.19	48
			Total	-6.32	11.17	96
		Total	NotAsked	-2.49	14.16	96
			Asked	-2.93	15.20	96
			Total	-2.71	14.65	192



Table 3b: Total Numerical Scores Based on the DoDPI Scoring System, Evaluator A.

Evaluator	Guilt	Outside Issue	Ol Question	Mean	Std. Dev.	N
DPI Evaluator A	Innocent	Absent	NotAsked	4.63	7.66	24
			Asked	7.17	8.25	24
			Total	5.90	7.98	48
		Present	NotAsked	-5.50	9.19	24
			Asked	-5.58	6.61	24
			Total	-5.54	7.92	48
		Total	NotAsked	-0.44	9.81	48
			Asked	0.79	9.81	48
			Total	0.18	9.78	96
	Guilty	Absent	NotAsked	-5.50	8.73	24
			Asked	-7.92	7.00	24
			Total	-6.71	7.92	48
		Present	NotAsked	-5.71	8.02	24
			Asked	-2.67	8.47	24
			Total	-4.19	8.31	48
		Total	NotAsked	-5.60	8.29	48
			Asked	-5.29	8.13	48
			Total	-5.45	8.17	96
	Total	Absent	NotAsked	-0.44	9.60	48
			Asked	-0.37	10.74	48
			Total	-0.41	10.13	96
		Present	NotAsked	-5.60	8.54	48
			Asked	-4.13	7.66	48
			Total	-4.86	8.10	96
		Total	NotAsked	-3.02	9.40	96
			Asked	-2.25	9.47	96
			Total	-2.64	9.42	192

Table 3c: Total Numerical Scores Based on the DoDPI Scoring System, Evaluator B.

Evaluator	Guilt	Outside Issue	OI Question	Mean	Std. Dev.	N
DPI Evaluator B	Innocent	Absent	NotAsked	6.62	9.13	24
			Asked	8.17	11.80	24
			Total	7.40	10.46	48
		Present	NotAsked	-5.58	8.71	24
			Asked	-6.29	6.87	24
			Total	-5.94	7.77	48
		Total	NotAsked	0.52	10.77	48
			Asked	0.94	12.03	48
			Total	0.73	11.36	96
	Guilty	Absent	NotAsked	-7.42	11.80	24
			Asked	-8.67	7.30	24
			Total	-8.04	9.73	48
		Present	NotAsked	-6.42	10.42	24
			Asked	-5.17	6.53	24
			Total	-5.79	8.63	48
		Total	NotAsked	-6.92	11.03	48
			Asked	-6.92	7.08	48
			Total	-6.92	9.22	96
	Total	Absent	NotAsked	-0.40	12.62	48
			Asked	-0.25	12.91	48
			Total	-0.32	12.70	96
		Present	NotAsked	-6.00	9.51	48
			Asked	-5.73	6.66	48
			Total	-5.86	8.17	96
		Total	NotAsked	-3.20	11.47	96
			Asked	-2.99	10.58	96
			Total	-3.09	11.00	192

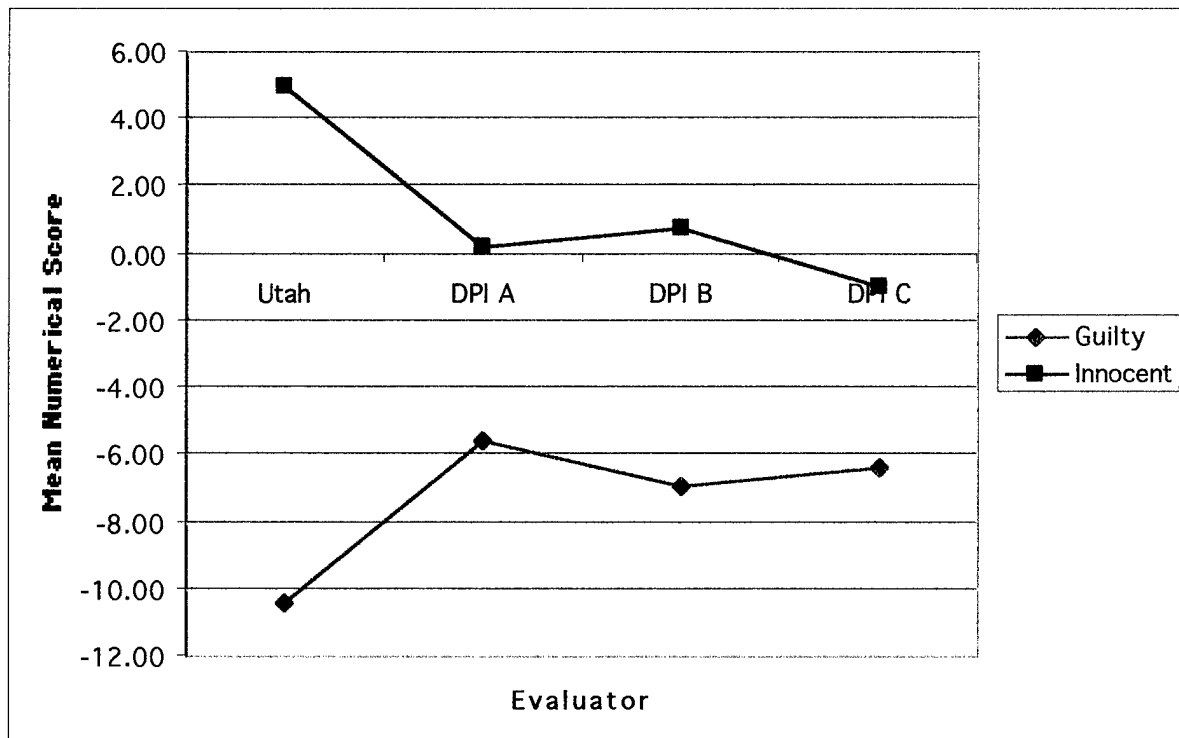
Table 3d: Total Numerical Scores Based on the DoDPI Scoring System Evaluator C.

Evaluator	Guilt	Outside Issue	OI Question	Mean	Std. Dev.	N
DPI Evaluator C	Innocent	Absent	NotAsked	2.21	6.72	24
			Asked	4.58	7.51	24
			Total	3.40	7.15	48
		Present	NotAsked	-5.88	7.75	24
			Asked	-4.92	5.26	24
			Total	-5.40	6.57	48
		Total	NotAsked	-1.83	8.26	48
			Asked	-0.17	8.01	48
			Total	-1.00	8.13	96
	Guilty	Absent	NotAsked	-7.21	7.13	24
			Asked	-8.67	6.21	24
			Total	-7.94	6.65	48
		Present	NotAsked	-5.17	7.81	24
			Asked	-4.50	6.09	24
			Total	-4.83	6.94	48
		Total	NotAsked	-6.19	7.47	48
			Asked	-6.58	6.44	48
			Total	-6.39	6.94	96
	Total	Absent	NotAsked	-2.50	8.34	48
			Asked	-2.04	9.55	48
			Total	-2.27	8.92	96
		Present	NotAsked	-5.52	7.71	48
			Asked	-4.71	5.63	48
			Total	-5.11	6.73	96
		Total	NotAsked	-4.01	8.13	96
			Asked	-3.38	7.91	96
			Total	-3.69	8.01	192

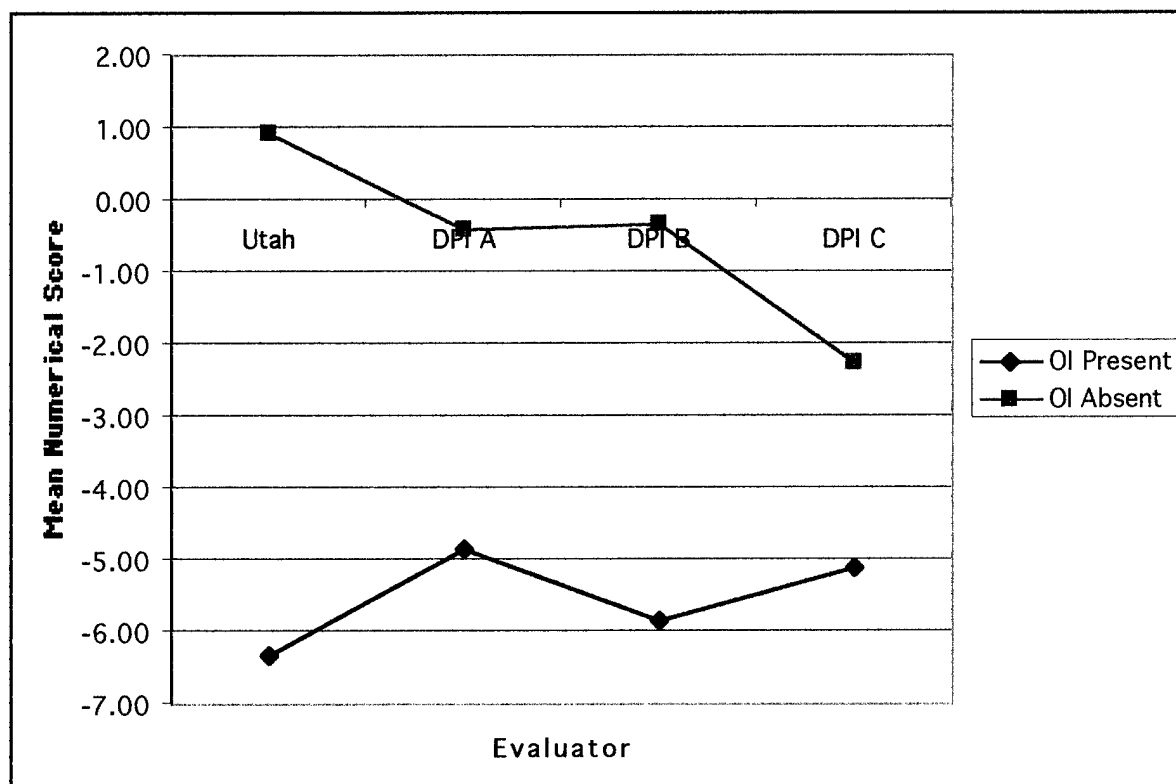
The repeated measures analysis of variance produced a number of significant main effects and interactions. We discuss the within subjects effects first. Tests of effects involving the Evaluator factor are summarized in Table 4. All analyses were Greenhouse-Geisser adjusted. The largest effect was the interaction of Evaluator X Guilt. The means for that effect are illustrated in Figure 1. This interaction appears to be primarily due to the fact that the Utah evaluator gave more positive scores to Innocent subjects and more negative scores to Guilty subjects than did the DoDPI evaluators. The other significant effect involving Evaluator was an interaction of Evaluator and Outside Issue. The means for that effect are illustrated in Figure 2. Here the Utah evaluator gave more positive numerical scores than the DoDPI evaluators when the outside issue was absent. The Utah evaluator also tended to give more negative scores than the DoDPI evaluators when the outside issue was present.

**Table 4. Significance Tests of the Mean Numerical Scores for Effects Involving the Within-Subjects Factor, Evaluator.**

Source	df	Mean Square	F	p
Evaluator	2.162	62.446	1.978	0.136
Evaluator X Guilt	2.162	1464.040	46.384	0.000
Evaluator X OI	2.162	226.787	7.185	0.001
Evaluator X OIQ	2.162	19.614	0.621	0.550
Evaluator X Guilt X OI	2.162	83.489	2.645	0.068
Evaluator X Guilt X OIQ	2.162	85.684	2.715	0.063
Evaluator X OI X OIQ	2.162	12.101	0.383	0.698
Evaluator X Guilt X OI X OIQ	2.162	51.182	1.622	0.197
Error	397.747	31.564		



**Figure 1. Means illustrating the significant interaction of Evaluator and Guilt.**

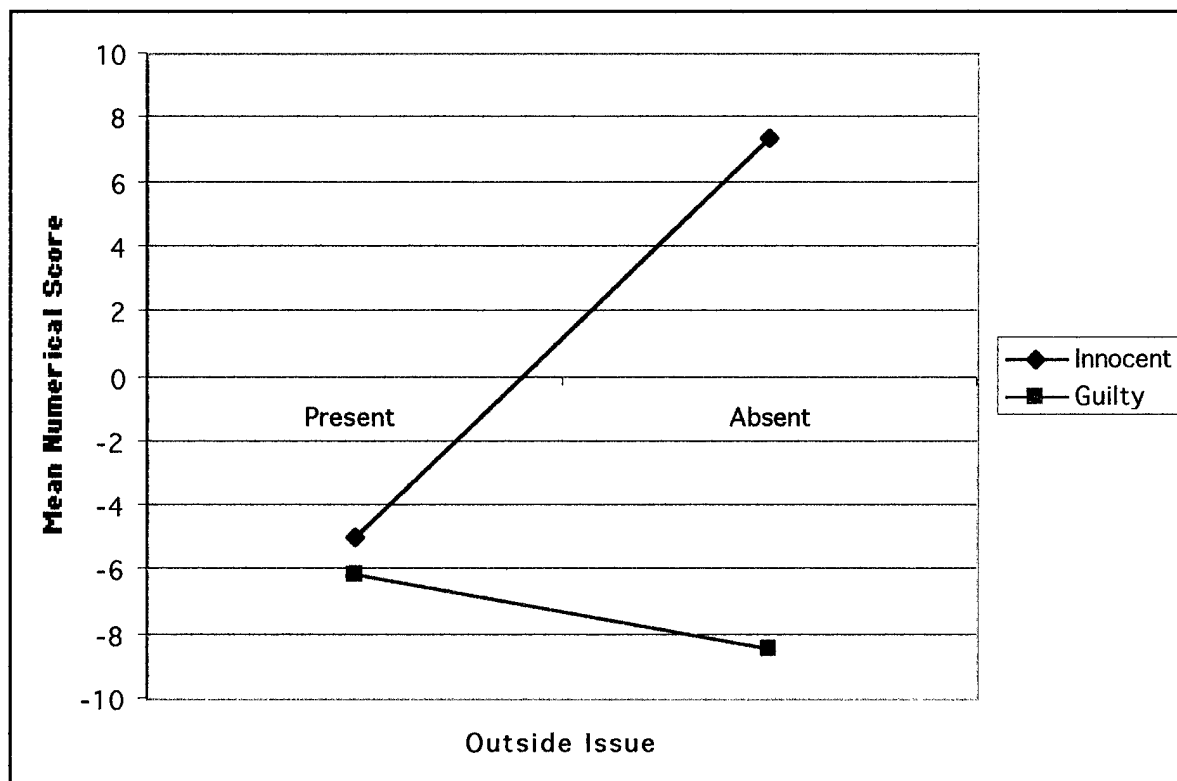


**Figure 2. Means illustrating the significant interaction of Evaluator and Outside Issue.**

The summary table for the between subjects effects from the ANOVA of the numerical scores are presented in Table 5. These effects represent differences between estimated means for the four evaluators. As expected innocent subjects produced more positive scores than did guilty subjects as was evidenced by the significant effect of Guilt, (Means = 1.221 and -7.286, respectively). The significant effect of Outside Issue indicated that the scores given when the outside issue was present were more negative than when the outside issue was absent, (Mean = -5.542 and -0.523, respectively). Means for the Guilt by Outside issue interaction are illustrated in Figure 3. This interaction represents the major effect of the Outside Issue variable. The outside issue had virtually no impact on subjects guilty of the primary crime. Their mean numerical scores were virtually unchanged whether the outside issue was present or absent (Means = -6.135 and -8.436, respectively). However, when the outside issue was present for subjects innocent of the primary crime, their numerical scores were dramatically effected making them appear almost as deceptive as subjects who actually were guilty of the primary crime (Means = -4.948 and 7.391, present and absent, respectively).

**Table 5. Significance Tests of the Mean Numerical Scores for the Between-subjects factors.**

Source	df	Mean Square	F	p
Guilt	1	13895.810	54.773	0.000
OI	1	4836.067	19.062	0.000
OIQ	1	16.685	0.066	0.789
Guilt X OI	1	10287.235	40.549	0.000
Guilt X OIQ	1	234.968	0.926	0.337
OI X OIQ	1	43.510	0.172	0.679
Guilt X OI X OIQ	1	575.468	2.268	0.134
Error	184	253.698		



**Figure 3. Means illustrating the significant interaction of Guilt and Outside Issue.**

## DECISIONS

### Reliability of Decisions

Decisions were coded for analysis as follows: 1 = Truthful, 2 = Inconclusive, and 3 = Deceptive. Tables crossing the decisions of the three DPI evaluators were formed. The DPI evaluators agreed on decisions 74.67% of the time. Correlation coefficients between DPI evaluator's decisions were also calculated. All values were significantly different from chance and averaged a value of,  $r = 0.726$ .

### Effects of the Independent Variables on Decisions

Cross tables were created for all conditions and all evaluators. Those results are presented as Tables 6A, B, C, and D. The basic control conditions in this study were the OIQ Asked and Outside Issue Absent condition for both guilty and innocent participants. It is interesting to compare the four evaluator's performance for that condition. All four evaluators produced better than chance results in that condition but there were substantial differences in detection efficiency as indexed by the detection efficiency coefficient (Kircher, Horowitz & Raskin, 1988). Detection efficiency coefficients were calculated for each of the four 2X3 contingency table formed by the design of this study. Those detection efficiency coefficients are reported for the respective evaluations in Tables 6A, B, C, and D. The Utah scoring produced a detection efficiency

**Table 6A. Decisions Based on the Utah Scoring System**

OI Question	Outside Issue			Decision			Count	Detection r
				Truthful	INC	Deceptive		
NotAsked	Absent	Guilt	Innocent	16	6	2	24	
			Guilty	3	5	16	24	
		Total		19	11	18	48	0.64***
	Present	Guilt	Innocent	7	8	9	24	
			Guilty	4	2	18	24	
		Total		11	10	27	48	0.30*
Asked	Absent	Guilt	Innocent	22		2	24	
			Guilty		2	22	24	
		Total		22	2	24	48	0.90***
	Present	Guilt	Innocent	5	8	11	24	
			Guilty	1	4	19	24	
		Total		6	12	30	48	0.35*

\*  $p < 0.05$     \*\*  $p < 0.01$     \*\*\*  $p < 0.001$

**Table 6B. Decisions Based on the DoDPI Scoring System, Evaluator A.**

OI Question	Outside Issue	Decision					Count	Detection r
		NDI	Inc	DI				
NotAsked	Absent	Guilt	Innocent	10	8	6	24	
			Guilty	2	4	18	24	
			Total	12	12	24	48	0.50***
	Present	Guilt	Innocent	2	4	18	24	
			Guilty	2	5	17	24	
			Total	4	9	35	48	-0.03
Asked	Absent	Guilt	Innocent	13	5	6	24	
			Guilty	1	3	20	24	
			Total	14	8	26	48	0.62***
	Present	Guilt	Innocent	1	7	16	24	
			Guilty	3	8	13	24	
			Total	4	15	29	48	-0.16
* p < 0.05	** p < 0.01	*** p < 0.001						

**Table 6C. Decisions Based on the DoDPI Scoring System, Evaluator B.**

OI Question	Outside Issue	Decision				Count	Detection r
		NDI	Inc	DI			
NotAsked	Absent	Guilt	Innocent	15	5	4	24
			Guilty	2	4	18	24
		Total		17	9	22	48 0.63***
	Present	Guilt	Innocent	1	3	20	24
			Guilty	3	3	18	24
		Total		4	6	38	48 -0.14
Asked	Absent	Guilt	Innocent	13	5	6	24
			Guilty		4	20	24
		Total		13	9	26	48 0.65***
	Present	Guilt	Innocent	1	6	17	24
			Guilty	1	5	18	24
		Total		2	11	35	48 0.04
* p < 0.05	** p < 0.01	*** p < 0.001					



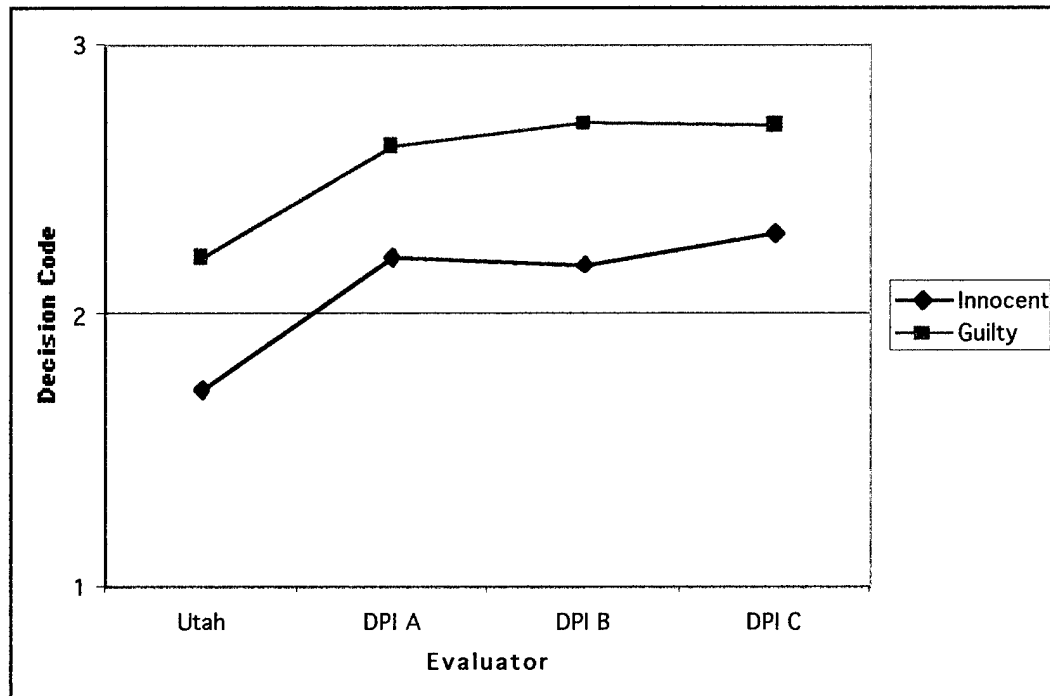
**Table 6D. Decisions Based on the DoDPI Scoring System, Evaluator C.**

OI Question	Outside Issue	Decision			Count	Detection r
		NDI	Inc	DI		
NotAsked	Absent	Guilt	Innocent	8	10	6
			Guilty		7	17
	Total		8	17	23	48
						0.54***
	Present	Guilt	Innocent	1	4	19
			Guilty	3	2	19
	Total		4	6	38	48
						-0.07
Asked	Absent	Guilt	Innocent	8	11	5
			Guilty		3	21
	Total		8	14	26	48
						0.66***
	Present	Guilt	Innocent		8	16
			Guilty	1	9	14
	Total		1	17	30	48
						-0.12

\*  $p < 0.05$     \*\*  $p < 0.01$     \*\*\*  $p < 0.001$

coefficient of 0.90 while the DoDPI evaluators produced coefficients of 0.62, 0.65, and 0.66 respectively. The Utah evaluation produced no false negative errors, 4% inconclusive outcomes and 8% false positive errors. The DoDPI examiners averaged a false negative rate of 1%, an inconclusive rate of 22%, and a false positive rate of 24%. Notably, the Utah evaluation produced significant detection efficiency coefficients for all four of the 2X3 tables. However, none of the DoDPI evaluations achieved better than chance performance with either of the tables where the Outside Issue was present. These differences were tested with a repeated measures ANOVA of the coded decision matrices. Evaluator was entered as a 4-level repeated measure and Guilt (1\$ stolen or not) Outside Issue (OI, 20\$ stolen or not) and Outside Issue Question (OIQ, asked or not) were entered as between-subjects factors.

We first examined effects involving the repeated measures factor. All analyses were Greenhouse-Geisser adjusted. Two tests produced significant results. There was a main effect of Evaluator,  $F(2.685, 494.093) = 15.283$ ,  $p < 0.001$ ,  $MSE = .218$ ). The Utah evaluator produced decisions significantly more in the truthful direction than any of the three DoDPI evaluators (Means = 2.21, 2.42, 2.44, and 2.50, respectively). There was also a significant interaction of Evaluator and Guilt,  $F(2.685, 494.093) = 17.521$ ,  $p < 0.001$ ,  $MSE = .218$ ). Means illustrating this effect are presented in Figure 4.



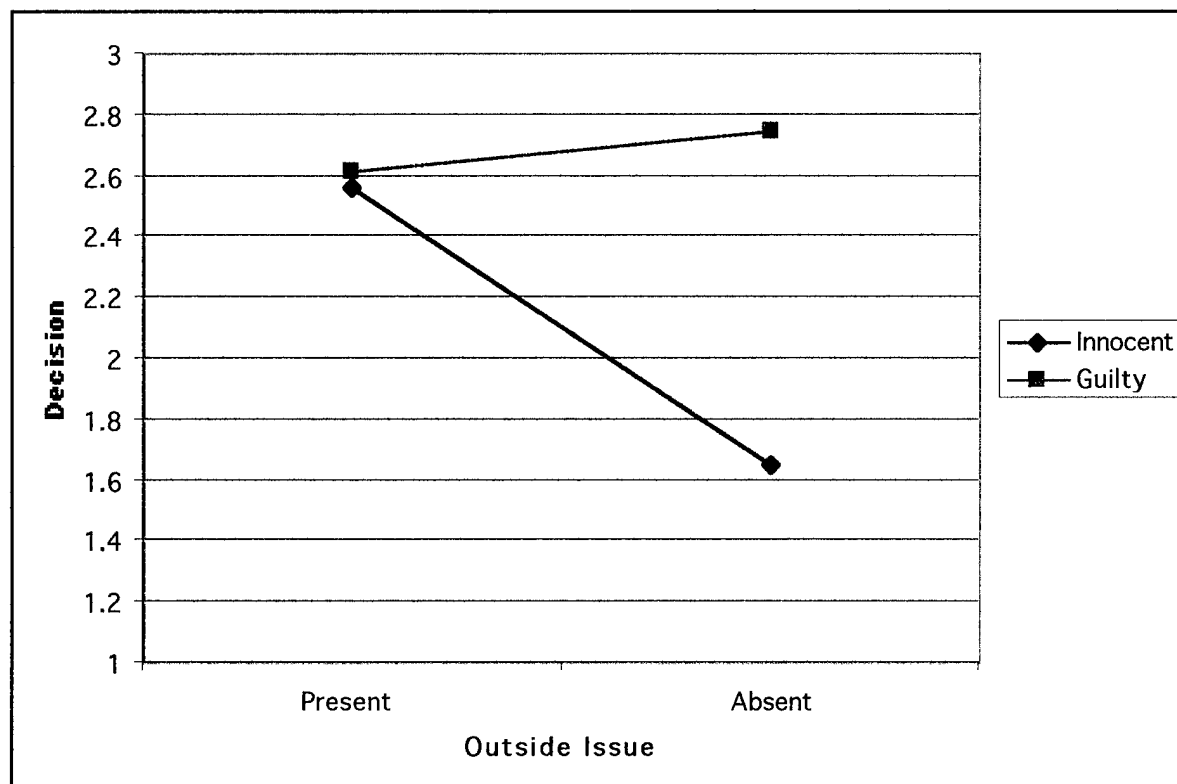
**Figure 4. Decision code means illustrating the significant Evaluator X Guilt interaction.**

We next examined the decision codes for between subject effects. The resultant ANOVA table is shown here as Table 7. The main effect of Guilt

**Table 7. Significance Tests of the Effects of the Between Subjects Factors.**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	4398.76	1	4398.76	4040.12	0.000
Guilt	64.17	1	64.17	58.94	0.000
OI	29.30	1	29.30	26.91	0.000
OIQ	0.13	1	0.13	0.12	0.730
Guilt X OI	53.13	1	53.13	48.80	0.000
Guilt X OIQ	0.88	1	0.88	0.81	0.370
OI X OIQ	0.42	1	0.42	0.39	0.534
Guilt X OI X OIQ	0.88	1	0.88	0.81	0.370
Error	200.33	184	1.09		

is the expected finding that across all evaluators and all other conditions Innocent subjects were given decisions more in the Truthful direction ( $M = 2.10$ ) than were Guilty subjects ( $M = 2.68$ ). The main effect for Outside Issue indicates that, overall, subjects were rated more in the Deceptive direction when the outside issue was present ( $M = 2.59$ ) than when the



**Figure 5. The Interaction of Guilt and Outside Issues on the Decision Variable.**

outside issue was absent ( $M = 2.20$ ). This significant interaction of Guilt and Outside issue is illustrated in Figure 5. This interaction highlights the fact that the effects of the outside issue were primarily on innocent subjects, strongly moving their decisions in the deceptive direction.

#### OUTSIDE ISSUE QUESTIONS AS OUTSIDE ISSUE DETECTORS

After scoring the polygraph data, the DoDPI evaluators were asked to make a judgment regarding whether each subject was being bothered by an outside issue. The DoDPI examiners responded to the following:

Please rate the following possibilities on the 7-point scales provided. Please circle the answer that corresponds to your choice. 1 = Not Likely At All 4 = Neutral (No Opinion) 7 = Very Likely

Was an outside issue bothering this subject? 1 2 3 4 5 6 7

Inter-rater reliability of these judgments were tested by correlating the judgments. The judgments were also correlated with a variable quantifying the Outside Issue (present, absent) variable. The results of those correlations are presented in Table 8. The average inter-rater

**Table 8. Inter-rater Correlations and Correlations with the Criterion for the Outside Issue Bothering Subject Judgment.**

	DoDPIa	DoDPIb	DoDPIc
Outside Issue	0.15	-0.09	-0.02
DoDPIa		0.22	0.22
DoDPIb			0.11
<b>Bold <math>p &lt; .05</math> 2-tailed</b>			

correlation was 0.183, indicating very poor agreement about the presence of an outside issue. Given the poor reliability, it is not surprising that none of the correlations with the outside issue criterion were significant. Using their present methods, DoDPI evaluators were not able to detect the presence of outside issues.

Additional analyses were undertaken in an effort to determine if any useful information was available in the responses to the outside issue questions. Using the Computerized Polygraph System, Version 3 (Kircher & Raskin, 1999) relative response magnitudes were calculated for all examination questions. The relative response magnitude (RRMs) gives a single global measure of the subject's physiological reaction to a particular question. RRM's for the two outside issue questions were tested with a repeated measures ANOVA. The two outside issue questions were entered as a repeated measures factor (Question). Guilt (1\$ taken or not) and Outside Issue (20\$ taken or not) were entered as between subjects factors. That analysis revealed a significant main effect of Question,  $F(1, 92) = 6.46$ ,  $p = .013$ . Although reliable, the difference between the two outside issue questions was very small,  $M_s = .33$  versus  $.35$ , respectively. None of the other tests in this analysis produced a significant result. There appears to be no useful discriminative information in the reactions to the outside issue questions, at least when they are considered by themselves.

To test the possibility that contrasts between the reactivity to the outside issue questions and other question types might provide some information that could be used to discriminate the presence/absence of an outside issue the following analysis was undertaken. Average RRM values were calculated for: the three relevant questions, the three comparison questions, the first two neutral questions (not all subjects received the third neutral question), and the two outside issue questions. Difference scores were then calculated by subtracting the mean RRM value for outside issue questions from the mean values for relevant, comparison, and neutral questions. The resulting three difference score vectors were then entered into a discriminant analysis where the presence or absence of the outside issue was the criterion. A significant discriminant function was returned, Wilks' Lambda = .954,  $\chi^2(1) = 4.44$ ,  $p = .035$ . The single variable in the equation was the difference score between the outside issue questions and the relevant questions. The canonical correlation

was .215. Classification accuracy was 66.7% with the outside issue absent subjects and 64.6% with the outside issue present subjects. Although significant, this is very poor performance and would no doubt decrease on cross-validation. It appears that there is very little, if any useful information in the physiological reactions to outside issue questions.

### **OUTSIDE ISSUE QUESTIONS AS COMPARISON QUESTIONS**

Analyses were undertaken to see if the outside issue questions could function as valid comparison questions. Using the Computerized Polygraph System, Version 3 (Kircher & Raskin, 1999) relative response magnitudes were calculated for all examination questions. The relative response magnitude (RRMs) gives a single global measure of the subject's physiological reaction to a particular question. For the following analyses, average RRM values were calculated for: the three relevant questions, the three comparison questions, and the two outside issue questions. Difference scores were then calculated by subtracting the mean RRM value for relevant question from the mean values for comparison and outside issue questions.

The first series of analyses were undertaken with only those subjects who did not receive the outside issue manipulation. It was felt that if the outside issue questions could not function as comparisons with these subjects, then further analyses would be unnecessary. Initially, a repeated measures ANOVA was conducted with the difference scores between relevant questions and outside issue questions and the difference scores between relevant questions and comparison questions entered as a two level repeated measure (Qtype). Guilt (1\$ taken or not) was entered as a between subjects factor. That analysis revealed a significant and strong main effect of Guilt,  $F(1, 46) = 36.86, p < .001$ . Innocent subjects produced more positive difference scores ( $M = 0.29$ ) than did Guilty subjects ( $M = -0.142$ ). The analysis also revealed a significant main effect of Qtype,  $F(1, 46) = 6.72, p = .013$ . Difference scores between relevant questions and comparison questions were more positive ( $M = -0.043$ ) than were difference scores between relevant questions and outside issue questions ( $M = -0.070$ ). The interaction of Guilt and Qtype was not significant,  $F(1, 46) = 3.69, ns$ .

We then explored the use of outside issue questions as comparison questions further with univariate analyses. First we conducted two Oneway ANOVAs with the difference scores between relevant questions and outside issue questions and between relevant questions and comparison questions as the dependent variables and Guilt (1\$ taken or not) as the grouping variable. Both analyses produced significant results, between relevant questions and outside issue questions,  $F(1, 46) = 27.97, p < .001$ , and between relevant questions and comparison questions  $F(1, 46) = 36.48, p < .001$ . Means illustrating these effects are shown in Table 9. As expected Innocent subjects produced positive difference scores and Guilty subjects produced negative difference scores. The power of these difference scores to discriminate innocent and guilty subjects was explored by correlating the difference scores with the Guilt (1\$ taken or not) criterion. The resulting correlations are also shown in Table 9. Both correlations were significant,  $p < .01$ .

**Table 9. Means and Standard Deviations for Difference Scores Between Relevant Questions and Control and Outside Issue Questions, Plus Correlations of the Difference Scores with the Guilt Criterion for Subject Who Did Not Experience the Outside Issue.**

Difference Score	Group	N	Mean	SD	r
Control - Relevant	Innocent	24	0.053	0.108	0.665
	Guilty	24	-0.138	0.110	
	Total	48	-0.043	0.145	
OIQ - Relevant	Innocent	24	0.005	0.081	0.615
	Guilty	24	-0.145	0.113	
	Total	48	-0.070	0.123	

The same family of analyses were conducted including those subjects who experienced the outside issue manipulation. First, a repeated measures ANOVA was conducted with the difference scores between relevant questions and outside issue questions and the difference scores between relevant questions and comparison questions entered as a two level repeated measure (Qtype). Guilt (1\$ taken or not) was entered as a between subjects factor. That analysis revealed a significant Main effect of Guilt,  $F(1, 94) = 26.32, p < .001$ . Innocent subjects produced more positive difference scores ( $M = -0.03$ ) than did Guilty subjects ( $M = -0.13$ ). The analysis also revealed a significant main effect of Qtype,  $F(1, 94) = 11.40, p = .001$ . Difference scores between relevant questions and comparison questions were more positive ( $M = -0.066$ ) than were difference scores between relevant questions and outside issue questions ( $M = -0.095$ ). The interaction of Guilt and Qtype was not significant,  $F(1, 94) = 0.55, ns$ .

We then explored the use of outside issue questions as comparison questions further with univariate analyses. First we conducted two Oneway ANOVAs with the difference scores between relevant questions and outside issue questions and between relevant questions and comparison questions as the dependent variables and Guilt (1\$ taken or not) as the grouping variable. Both analyses produced significant results, between relevant questions and outside issue questions,  $F(1, 94) = 23.58, p < .001$ , and between relevant questions and comparison questions  $F(1, 94) = 20.98, p < .001$ . Means illustrating these effects are shown in Table 10. As expected Innocent subjects produced positive difference scores and Guilty subjects produced negative difference scores. The power of these difference scores to discriminate innocent and guilty subjects was explored by correlating the difference scores with the Guilt (1\$ taken or not) criterion. The resulting correlations are also shown in Table 9. Both correlations were significant,  $p < .01$ .

**Table 10. Means and Standard Deviations for Difference Scores Between Relevant Questions and Control and Outside Issue Questions, Plus Correlations of the Difference Scores with the Guilt Criterion for Subjects Who Did Experience the Outside Issue.**

Difference Score	Group	N	Mean	SD	r
Control - Relevant	Innocent	48	-0.010	0.120	0.448
	Guilty	48	-0.122	0.106	
	Total	96	-0.066	0.126	
OIQ - Relevant	Innocent	48	-0.046	0.114	0.427
	Guilty	48	-0.145	0.098	
	Total	96	-0.095	0.117	

## Discussion

The results of this study show that outside issues can have a major impact on the validity of polygraph examinations. However, the nature of that impact is not on the false negative rate, as was predicted by most commentators in the polygraph profession, rather the major impact is on the false positive rate. When a subject is truth telling with regard to the subject matter of a polygraph examination, but has an unrelated outside issue, the results of this study suggest that she or he is very likely to fail the examination.

The results of this study also indicate that the inclusion of outside issue questions neither detects, nor does it ameliorate the problems associated with the presence of an outside issue. The DoDPI evaluators in this study were essentially unable to agree even as to when the presence of an outside issue was indicated. At best they shared no more 4.84% common variance in their judgements about the presence or absence of an outside issue. Additional analyses revealed that this was not a surprising outcome since there was very little information in the physiological data to use to discriminate outside issue present from outside issue absent subjects.

These results suggest that outside issues should become a topic of greater concern for polygraph examiners, the polygraph profession, and for polygraph researchers. The strength of outside issues as an independent variable suggests that they may be a major contributor to the high false positive rates seen in some field polygraph studies. It may be that in those studies that have reported high false positive rates, the subject population was prone to a high frequency of outside issues. On the other hand, those studies that have reported high false positive rates may have used polygraph examiners and/or polygraph techniques that are particularly insensitive to innocent subjects' concerns about the presence of outside issues. This may be a particularly serious problem for law enforcement examiners since the falsely accused may well view police polygraph examiners with great suspicion. Those polygraph examiners who approach the examination in an accusatory/interrogative manner would seem particularly prone to heighten an innocent subject's concerns about outside issues and increase the number of false positive outcomes.

On the other hand, the results of the present study suggest that outside issues pose little or no problem for subjects who are attempting deception to the relevant questions of the examination. Concerns about other undiscovered crimes overwhelming relatively weaker relevant questions appear to be groundless. Examiners in situations where the cost of false negative results is high should be reassured by these results.

The contrast between the Utah scoring system/approach and the DoDPI scoring system/approach produced interesting, but confounded results. The Utah method significantly outperformed the DoDPI methods at almost every level. In terms of decisions in the basic control conditions, the Utah method produced many fewer inconclusive outcomes (4% versus 22%) and many fewer false positive errors (8% versus 24%). In those conditions where outside issues were present, the Utah system still produced significant discrimination of truth



tellers and deceivers while the DoDPI system performed at chance levels. The factors accounting for these differences are not clear, and deserve more study. Three variables present themselves as likely candidates to account for the Utah systems superiority. First, the Utah scoring rules (Bell, et al., 1999) are based on basic scientific and psychometric principles while the DoDPI rule evolved from clinical practice. The Utah system is much simpler and should therefore be more reliable. Moreover, there is scientific research to support the validity of all of the scoring criteria used in the Utah system. The same cannot be said of the DoDPI system, some of whose criteria violate the basic laws of nature (e. g., DoDPI allows for scoring of decreases from baseline in the electrodermal response, despite the fact that such a "reaction" on the chart cannot have a physiological basis). The archaic nature of the DoDPI scoring system has been commented upon in the literature for a number of years (Raskin, 1986, Honts & Perry, 1991).

The second possible contributor to the differences between the Utah and the DoDPI scorings is the use of the finger pulse amplitude (FPA) measure. The BSU evaluator used the FPA measure while the DoDPI evaluators did not. The statistical analyses reported in Table 2 of this report show that for the Utah evaluator, the FPA was highly correlated with the criterion. In fact the FPA value for the Utah evaluator was higher than any of the blood pressure or respiration values for the DoDPI evaluators. These results suggest that DoDPI performance could be significantly enhanced by adoption that long standard and scientifically well know dependent measure.

Perhaps the most puzzling finding of this study was that despite the fact that outside issue questions had essentially no ability to detect the presence of our manipulated outside issue, the outside issue questions were found to function as potentially valid comparison questions. Although, the outside issue questions used as comparison questions were not as strong as the traditional comparison questions, the differences were small. It appears that asking a polygraph subject, "Is there something else you are afraid I will ask you a question about?" is approximately the functional equivalent of asking the same subject, "Prior to 1998, did you ever do anything that was dishonest or illegal?" This surprising and unexpected finding is clearly deserving of additional research along with the general topic of outside issues.

## References

- Backster, C. (1976) 'Outside issue' factor. Handout from polygraph examiner course PE-68. Backster School of Lie Detection, San Diego, CA.
- Bell, B. G., Raskin, D. C., Honts, C. R., & Kircher, J. C. (1999). The Utah numerical scoring system. *Polygraph*, 28, 1-9.
- Capps, M. H., Knill, B. L., & Evans, R. K. (1993). Effectiveness of the symptomatic questions. *Polygraph*, 22, 285-298.
- Department of Defense Polygraph Institute. (1997). *Zone comparison test (ZCT)*. Unpublished document.
- Hess, C. (1976). The "symptomatic" question. Lecture notes from polygraph examiner course PE-68. Backster School of Lie Detection, San Diego, CA.
- Honts, C. R., Hodes, R. L., & Raskin, D. C. (1985). Effects of physical countermeasures on the physiological detection of deception. *Journal of Applied Psychology*, 70, 177-187.
- Honts, C. R., & Perry, M. V. (1992). Polygraph admissibility: Changes and challenges. *Law and Human Behavior*, 16, 357-379.
- Honts, C. R., & Raskin, D. C. (1988). A field study of the validity of the directed lie control question. *Journal of Police Science and Administration*, 16, 56-61.
- Honts, C. R., Raskin, D. C., & Kircher, J. C. (1987). Effects of physical countermeasures and their electromyographic detection during polygraph tests for deception. *Journal of Psychophysiology*, 1, 241-247.
- Honts, C. R., Raskin, D. C., & Kircher, J. C. (1994). Mental and physical countermeasures reduce the accuracy of polygraph tests. *Journal of Applied Psychology*, 79, 252-259.
- Horowitz, S. W., Raskin, D. C., Honts, C. R., & Kircher, J. C. (1997). The role of comparison questions in physiological detection of deception. *Psychophysiology*, 34, 108-115.
- Kircher, J. C., Horowitz, S. W., & Raskin, D. C. (1988). Meta-analysis of mock crime studies of the control question polygraph technique. *Law and Human Behavior*, 12, 79-89.
- Kircher, J. C. & Raskin, D. C. (1988). Human versus computerized evaluations of polygraph data in a laboratory setting. *Journal of Applied Psychology*, 73, 291-302.

Kircher, J. C. & Raskin, D. C. (1999). *CPS Version 3.00 Tutorial*. Salt Lake City: Scientific Assessment Technologies.

Raskin, D. C. (1986). The polygraph in 1986: Scientific, professional, and legal issues surrounding acceptance of polygraph evidence. *Utah Law Review*, 1986, 29-74.

*United States v. Cordoba* (1997). District Court No. CR-95-00039-GT. Available online at: <http://www.vcilp.org/Fed-Ct/Circuit/9<sup>th</sup>/opinions/9550492.htm>

*United States v. Scheffer* (1996). 44 MJ, 442.

## **Appendices**

### **Appendix A: Help Wanted Ad**

**"Temporary employment as a participant in polygraph research. Pays \$15.00/hr. One day only for 2 1/2 hours. Call 426-4160 and leave a message."**

## Appendix B: Telephone Checklist to Screen Participants

### Phone Checklist

Applied Cognition Research Institute, this is \_\_\_\_\_ speaking, how may I help you?

They may ask what the job requires, briefly explain: This is a research study assessing the validity of polygraphs (lie detectors). You will be paid \$15 an hour, for approximately 2 1/2 hours, with a possibility of a bonus ranging from \$1.00 to \$21, which is randomly determined. The payment is in the form of a check and will be given to you at the end of your appointment.

Criteria:	Response:	Answers Required to Participate:
Are you 18 years or older?	Y    N	Yes
Do you have any illness that requires you take prescription medication?	Y    N	No ( on at least blood pressure, heart and psycho-drugs-anti depressant)
Are you currently under the care of a psychologist or psychiatrist?	Y    N	No
Have you ever taken a polygraph before?	Y    N	No

Subject Does Not Meet Criteria:	Subject Meets Above Criteria:
I'm sorry, you do not meet the necessary requirements for the purpose of this study. Thanks for your time and interest.	You meet all of the criteria.

What is your Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Day Phone: \_\_\_\_\_ Work Phone: \_\_\_\_\_

What day and time is best for you? \_\_\_\_\_

Your appointment time is: \_\_\_\_\_

We are located at 2200 University Ave., across from Old Campus School. The nearest cross street is Brady

You will be mailed a packet of information that contains a reminder of your appointment time, a parking pass, and a map of the BSU area with the General Parking and our building location circled.

Please arrive at least five minutes prior to your appointment time.

If you need to cancel or re-schedule your appointment, please contact us at least 24 hours in advance. Our phone number is 426-4160.

## **Appendix C: Script for Video in OIQ Study—Concerning Informed Consent**

Hello, I am Dr. Eric Landrum, the Chair of the Department of Psychology at Boise State University. I want to welcome you to the polygraph study being conducted by our Department in association with the Department of Defense.

The purpose of this video is to inform you about your role in this study, your rights as a participant, and to give you the opportunity to consent to participating in this study.

You have been given an INFORMED CONSENT FORM that we will ask you to sign if you agree to participate in this study. Please listen carefully to this video and then read the form. If you are then willing to participate in this study please sign the form when the assistant returns.

When this video is completed, the assistant will return to the room. If you have any questions or concerns, please raise them with the assistant at that time.

The goal of this study is to determine if people can defeat the polygraph (lie detector) under three subject conditions.

**Procedure:** You will be asked to complete a simple task or series of tasks. The task or tasks that you will complete depend upon which condition of the study you are assigned to. All tasks will be explained to you on separate videotapes. It will be randomly determined which condition that you are in, but please be aware that some of the conditions will require that you steal some money. Upon completion of the tasks, you will be given a polygraph (lie detector) examination.

**The polygraph examination will focus on your answers to the items regarding the theft of some money. The polygraph examiner will not know if your answers are true or false, and your objective during the examination will be to convince the polygraph examiner that you had nothing to do with the theft. If you are successful in beating the polygraph, you will be paid a bonus ranging from \$1.00 to \$20.00. To win the bonus, you must appear truthful to all of the questions on the polygraph tests. After completing the polygraph examination, you will then be debriefed by a research assistant and awarded the bonus if earned.**

**Again, the polygraph examiner will not know if your answers are true or false, and your task will be to convince the polygraph examiner that you had nothing to do with the theft in question. If you are successful in beating the polygraph, you will be paid the bonus. To win the bonus, you must appear truthful to all of the questions on the polygraph tests.**

After signing the consent form, you will be given either one or two more videotapes to watch which will explain to you the condition that you were randomly assigned to. The task or tasks that you need to complete will be fully explained in the videotape(s). If you receive instructions to watch two more videotapes, please be aware that you will be completing two tasks. If you receive instructions to watch one more videotape you will only be completing one task. After you complete the tasks, you will be taken to another room and introduced to the polygraph examiner. The polygraph examiner will review each of the questions to be used on the tests and will describe the testing procedure to you.

During the polygraph test portion of this experiment, several sensors will be attached to your left hand, a blood pressure cuff will be placed on your right arm, and two elastic straps will be attached around your chest and abdomen (on top of your clothes) to measure breathing. All sensors are attached with adhesive collars or Velcro.

**None of these sensors will hurt you in any manner, although the blood pressure cuff will squeeze your arm.**

Prior to their placement on your body, the sensors will all be shown to you and their use will be explained.

After the sensors are attached, the polygraph examiner will read the test questions while making the polygraph recordings. You will have to answer each question with just a "Yes" or "No", but please remember that your goal is to appear truthful and as though you were not involved in the theft.

**Duration and Benefits:**

You will be paid \$15 per hour for about two hours of your time.

You will be paid an additional bonus ranging from \$1.00 to \$20.00 if a standard computer analysis of your physiological responses during your polygraph tests reveals that you are truthful to all of the test questions.

This determination of truthfulness is calculated by comparing your patterns of physiological responding to the individual polygraph test items. In theory, an individual displays different patterns of responding when being truthful or deceptive. The computer analysis will examine your patterns of responding and assign a value indicating the probability of your truthfulness. If the analysis determines that your patterns of physiological responding are similar to patterns displayed by a truthful individual, the probability of your being truthful will be higher than the probability of your being deceptive (greater than .50).

If this analysis determines you are truthful to all of the test questions, you will earn the bonus.

If you decide to withdraw from the study, you will be paid \$15 per hour of participation, but will not be eligible for the bonus.

**Videotaping:**

Some of the polygraph examinations in this study will be videotaped. When you sign the consent form you are giving us permission to videotape your polygraph examination. These videotapes are being made to document the procedures of this study and to be used in presentations, teaching and training in professional settings. By signing the consent form you will be giving us permission to use your image on the videotape for professional presentations. However, if we decide to use your image for such professional purposes, your name and any identifying information will be edited from the tape.

**Confidentiality:**

A list of the names of participants will be maintained until the end study at which time it will be destroyed. A code number will be used to organize the physiological data but will not be associated with your name or any other personally identifying information.

Your name or any other personally revealing information will not be included in any publication or reports of this research or in any presentations on this study.

**Risks:**

There are no known risks to you physically or mentally for participating in this study.

**Withdrawal:** Your participation in this study is voluntary. If at any time you wish to withdraw from the study you may do so and receive payment for the time you have spent to that point.

**Concerns:** If you have any concerns about how this study was conducted or about protection of your confidentiality you may contact either Dr. Charles Honts (426-3695) or Dr. Susan Amato (426-4445) in the Psychology Department at Boise State University.

**Please wait for the return of the research assistant. Do not sign the Informed Consent Form until the assistant returns.**

Thank you again for your interest and time in assisting the Department of Psychology in this research.



## **Appendix D: Informed Consent Sheet**

The purpose of this document is to inform you about your role in this study, your rights as a participant, and to give you the opportunity to consent to participating in this study.

**Purpose:** The goal of this study is to determine if people can defeat the polygraph (lie detector) under three subject conditions. This project is funded by the Department of Defense.

**Procedure:** During the first stage of the study, you will be assigned a condition (i. e., innocent/deceptive). You will then be asked to complete a simple task or series of tasks. Upon completion of the tasks, you will be given a polygraph (lie detector) examination. The polygraph examination will focus on your answers to the items regarding the task that you were asked to complete. The polygraph examiner will not know if your answers are true or false, and your objective during the examination will be to convince the polygraph examiner that your answers to all of the questions are true. If you are successful in beating the polygraph, you will be paid a bonus ranging from \$1 to \$20. To win the bonus, you must appear truthful to all of the questions on the polygraph tests. After completing the polygraph examination, you will be debriefed by a research assistant and awarded the bonus if earned.

After completing the required tasks, you will be taken to another room and introduced to the polygraph examiner. The polygraph examiner will review each of the questions to be used on the tests and will describe the testing procedure to you. To monitor your physiological reactions to test questions, several sensors will be attached to your right hand, a blood pressure cuff will be placed on your left arm, and two elastic straps will be attached around your chest and abdomen (on top of your clothes) to measure breathing. All sensors are attached with adhesive collars or Velcro. None of these sensors will hurt you in any manner. Prior to their placement on your body, the sensors will all be shown to you and their use will be explained. In your polygraph test the polygraph examiner will read the test questions to you while making the polygraph recordings. Regardless of the testing format, you will answer each question with only a "Yes" or "No."

**Duration and Benefits:** You will be paid \$15 per hour for about two and a half hours of your time. You will be paid an additional bonus ranging from \$1 to \$20 if a standard computer analysis of your physiological responses during your polygraph tests reveals that you are truthful to all of the test questions. This determination of truthfulness is calculated by comparing your patterns of physiological responding to the individual polygraph test items. In theory, an individual displays different patterns of responding when being truthful and deceptive. The computer analysis will examine your patterns of responding and assign a value indicating the probability of your truthfulness. If the analysis determines that your patterns of physiological responding are similar to patterns displayed by a truthful individual, the probability of your being truthful will be higher than the probability of your being deceptive (greater than .50). If this analysis determines you are truthful to all of the test questions, you will earn the bonus. No deception is involved in this study. But if for any reason you decide to withdraw from the study, you will be paid \$15 per hour of participation, but you will not be eligible for the bonus.

**Videotaping:** Some of the polygraph examinations in this study will be videotaped. When you sign the consent form, you are giving us permission to videotape your polygraph examination. These videotapes are being made to document the procedures of this study and to be used in presentations, teaching and training in professional settings. By signing the consent form, you will be giving us permission to use your image on the videotape for professional presentations. However, if we decide to use your image for such professional purposes, your name and any identifying information will be edited from the tape.

**Confidentially:** A list of the names of participants will be maintained until the end study at which time it will be destroyed. A code number will be used to organize the physiological data but will not be associated with your name or any other personally identifying information. Your name or any other personally revealing information will not be included in any publication or reports of this research.

**Risks:** There are no known risks to you physically or mentally for participating in this study.

**Withdrawal:** Your participation in this study is voluntary. If at any time you wish to withdraw from the study you may do so and receive payment for the time you have spent to that point.

**Concerns:** If you have any concerns about how this study was conducted or about protection of your confidentiality you may contact Dr. Charles Honts (426-3695) or Dr. Susan Amato (426-4445) in the Psychology Department at Boise State University.

**Consent:** I, \_\_\_\_\_, have read the above description of this study and understand it. I also understand this study is funded by the Department of Defense. I have received a copy of this Informed Consent form. I agree to participate in this research.

\_\_\_\_\_/\_\_\_\_\_  
(Signed) (Date)

\_\_\_\_\_/\_\_\_\_\_  
Witness (Date)

This project has been reviewed and approved by the Boise State University Institutional Review Board for the protection of human subjects in research

## **Appendix E: Video Watching Instructions—Innocent**

By now you should have watched the informed consent form, and signed the consent form. This packet contains all of the materials and directions that you need to complete this experiment. Once you have opened this packet, you will not be able to ask questions regarding the condition you have been assigned to or the experiment, until the polygraph exam is completed and you meet with the original research assistant again.

Please follow the directions carefully.

1. Open this packet.
2. Remove all materials.
3. Insert the video labeled “**Tape C**” into the VCR and press Play.
4. Watch the video.
5. Push Stop and then Rewind.
6. Eject when the video is finished rewinding.
7. Place the video back in its container and then back on the table in front of you.
8. Collect everything that you need to complete your mission and put the rest of the materials (if any) back in the packet and leave it on the table while you complete your mission.
9. After you return you will be given a polygraph examination.
10. After the polygraph examination is completed, you meet again with the original research assistant.
11. The research assistant will ask you questions about your polygraph examination, the condition you were assigned to, and a few other questions for data collection purposes. You should answer all of the questions honestly.
12. The research assistant will pay you with a check for the total amount you qualify for.

Thank you again for your participation.

## **Appendix F: Script for Video in OIQ Study—Instructions for Innocent Subjects**

By now you have agreed to be a participant in this study, have signed the Informed Consent Form.

As stated in the previous videotape, there are several conditions in this study. This videotape will tell you about your role in the experiment.

Your assignment to be either a truth teller or a deceiver was made on a random basis by one of the scientists conducting this study. A copy of this video was placed on this table yesterday by that scientist.

**Neither the research assistant who gave you this videotape nor the polygraph examiner, know whether you will be telling the truth or lying on the polygraph examination.**

You have been selected to be in the innocent condition.

Please listen to these instructions carefully and make sure that you understand exactly what you are to do. Replay this tape if necessary. You may make a few notes to help you remember what to do as you carry out these instructions.

There are writing materials, along with a written (text) version of this entire process, provided in the packet that you have been given. This is a polygraph (lie detection) experiment. Half of the subjects in the experiment are instructed to commit a theft. They are told to go to a room and steal money from an envelope. They are instructed to go to a room and steal some money from an envelope. Then they report back for a polygraph (lie detector) examination. If they are found innocent on the test, they are paid a bonus in addition to the amount paid for participating in the experiment.

**You are not one of those subjects. You are not to steal anything.** Your mission, if you choose to accept it, will be to drop off an envelope (located in this packet) in a file folder outside the door of room 622 in the Education Building.

You are an innocent suspect, but you must be found innocent on the polygraph examination in order to receive the bonus. The bonus, in addition to the amount you will be paid for your time participating in this experiment, is \$1.00. Therefore, it is in your best interest to be truthful during the test and deny having anything to do with the theft of the money.

Before you leave this room, check the time. You have 20 minutes to complete this task. Do not return early. If you finish early, wait until the 20 minutes are up, and then return to the room you are in now, and wait until an experimenter comes for you.

You will then be given a polygraph test by a polygraph examiner. She will not know if you are innocent or guilty of the theft, which is why she will treat you as though you are a suspect. This means that she will have to make her decision entirely on the basis of the polygraph test.

**You will receive the dollar bonus only if the examiner finds you innocent.** So you must actually convince the examiner that you are innocent. If she decides when the examination is over that you are deceptive or she cannot decide whether you are deceptive or innocent, you will not receive the bonus.

Those are your instructions. **You must follow those instructions exactly if you are to be eligible for the pay and for the bonus.** If you do not wish to participate in this experiment, please inform anyone in Room 5 (across the hall). If you are not entirely sure of what you are to do, push the stop button and rewind the tape by pushing the rewind button. Then push the play button to hear the instructions again. When you are done, push the stop button.

**Once you leave this room, you should return in exactly 20 minutes, not sooner, and not later. That is it. Good luck with the examination.**

## **Appendix G: Directions for Innocent Subjects**

- Leave the Lab from the back door (the wooden ramp)
- Cross the street to the blue flashing light, number 16
- Facing the light you want to turn left
- Follow the side walk, until you reach the Science Nursing sign
- At the sign go right diagonally to the row of four doors, next to the telephone.
- As you enter the building (which is the Education building) go to the right of the Directory sign to the elevators.
- Select the up button
- Go to the 6<sup>th</sup> floor
- As you exit the elevator on the 6<sup>th</sup> floor proceed down the hall towards room #636
- Take a right at room #636
- Walk down the hall
- At the end of the hall take a left
- Walk down to room #622
- Drop off the envelope at this door
- Return to the Lab (where you started)
- Remember you must not return any earlier than 20 minutes after you left.

## **Appendix H: Video Watching Instructions—Innocent (\$20.00)**

By now you should have watched the informed consent form, and signed the consent form.

This packet contains all of the materials and directions that you need to complete this experiment. You will not be able to ask questions regarding the condition you have been assigned to or the experiment, until the polygraph exam is completed and you meet with the original research assistant again.

1. Please follow the directions carefully.
2. Remove all materials from this packet.
3. Insert the video labeled “**Tape B**” into the VCR and press Play.
4. Watch the video.
5. Push Stop and then Rewind.
6. Eject when the video is finished rewinding.
7. Place the video back in its container and then back on the table in front of you.
8. Collect everything that you need to complete your mission and put the rest of the materials (if any) back in the packet and leave it on the table while you complete your mission.
9. After you return you will be given a polygraph examination.
10. After the polygraph examination is completed, you meet again with the original research assistant.
11. The research assistant will ask you questions about your polygraph examination, the condition you were assigned to, and a few other questions for data collection purposes. You should answer all of the questions honestly.
12. The research assistant will pay you with a check for the total amount you qualify for.

Thank you again for your participation.

## **Appendix I: Script for Video in OIQ Study—Instructions for Innocent Subjects (\$20.00)**

By now you have agreed to be a participant in this study, and have signed the Informed Consent Form.

As stated in the previous videotape, there are several conditions in this study. This videotape will tell you about your role in the experiment.

Your assignment to be either a truth teller or a deceiver was made on a random basis by one of the scientists conducting this study. A copy of this video was placed on this table yesterday by that scientist.

**Neither the research assistant who gave you this packet nor the polygraph examiner, know whether you will be telling the truth or lying on the polygraph examination.**

You have been selected to be in a condition that requires you to steal some money.

Please listen to these instructions carefully and make sure that you understand exactly what you are to do. Replay this tape if necessary. You may make a few notes to help you remember what to do as you carry out these instructions.

There are writing materials, along with a written (text) version of this entire process, provided in the packet that you have been given. This is a polygraph or lie detection experiment. You will be stealing twenty dollars. You will then be given a polygraph examination concerning a different theft – the theft of a one-dollar bill. If you can beat the polygraph by appearing innocent on that test, you will be paid a bonus equal to the amount you have stolen in addition to the amount that you will be paid for participating in the experiment.

Your mission, if you choose to accept it, is as follows: You will go to room 640 of the Education Building, which is a students study room. Because this is a study room, there will probably be some students there. Please announce to anyone in the room that you are the treasurer of the Psychology Club, and that you need to pick up Jenny Wilkenson's membership dues from the top drawer of the file cabinet. You can either enter the file cabinet yourself by opening the top drawer and searching for the envelope marked "Jenny Wilkenson's dues", or you can direct somebody to assist you if people are in the way of the file cabinet. Once you have the envelope in your possession, immediately leave the room. After you are safely out of sight of anyone in the study room you should verify the contents of the envelope. Take the twenty dollars out of the envelope and conceal it on your person. You can hide it in your wallet or in any of your pockets, but do not put it in your shoe or in your sock. Tear the envelope up and dispose of it in any trash can.

**If you are found innocent on the polygraph examination, you will be paid a bonus equal to that which you stole.** However, you must return the money from the envelope when the polygraph examination is completed. Be careful not to leave any fingerprints, and be sure to dispose of the envelope where it will not be found. It is extremely important that you steal the money without alerting anyone to the theft. For example, since there are faculty offices around room 640, be sure to have your alibi ready in case someone asks you what you are doing. **You are not, and I repeat, not to tell anyone that you are participating in an experiment. YOU DO NOT WANT TO GET CAUGHT COMMITTING THIS CRIME,** so be prepared to act as though you really are the Psychology Club treasurer.

Before you leave this room, check the time. You have 20 minutes to complete your theft once you leave. Do not return early. If you finish early, wait until the 20 minutes are up, and then return to the room you are in now, and wait until an experimenter comes for you.

You will then be given a polygraph test by a polygraph examiner. She will be testing you about the theft of a one-dollar bill. She will not know if you are innocent or guilty of the theft because half of the subjects in the experiment have not committed that particular theft. This means that she will have to make her decision entirely on the basis of the polygraph test.

**You will receive the twenty-dollar bonus only if the examiner finds you innocent.** So you must actually convince the examiner that you are innocent. If she decides when the examination is over that you are guilty or she cannot decide whether you are guilty or innocent, you will not receive the bonus.

Also, you must not make her suspicious when she is interviewing you during the initial portion of the test. The innocent subjects in this experiment do not know any details of the theft such as the room number or what is in the envelope. They know only that the deceptive subjects have stolen some money. They do not know anything else. You could easily give yourself away by accidentally revealing any other details, so please maintain your innocence wisely.

**So, when the polygraph examiner asks you questions about any other details about the theft, you must not only deny knowing anything other than that, but you must do so sincerely so that she does not become suspicious.** If at some point during the test you think you blew it, do not give up. You may still be able to beat the test, but if you confess, you will not even be eligible to receive the money that is paid for passing the polygraph examination.

Those are your instructions. **You must follow those instructions exactly if you are to be eligible for the pay and for the bonus.** If you do not wish to participate in this experiment, please inform anyone in Room 5 (across the hall). If you are not entirely sure of what you are to do, push the stop button and rewind the tape by pushing the rewind button. Then push the play button to hear the instructions again. When you are done, push the stop button. Once you leave this room, you should return in exactly 20 minutes, not sooner, and not later. That is it. Good luck with the examination.



## **Appendix J: Directions for Innocent Subjects (\$20.00)**

- Leave the Lab from the back door (the wooden ramp)
- Cross the street to the blue flashing light, number 16
- Facing the light you want to turn left
- Follow the side walk, until you reach the Science Nursing sign
- At the sign go right diagonally to the row of four doors, next to the telephone.
- As you enter the building (which is the Education building) go to the right of the Directory sign to the elevators.
- Select the up button
- Go to the 6<sup>th</sup> floor
- As you exit the elevator on the 6<sup>th</sup> floor proceed down the hall towards room #636
- Take a right at room #636
- Walk down the hall
- At the end of the hall take a left
- Walk down to room #640; Say to the student at the table, "Hi. I am the treasurer for Psychology Club and I need to pick up Jenny Wilkenson's membership dues from the filing cabinet." If no one is in the study room, remove the envelope from the cabinet yourself.
- Verify the contents
- Place the money on your person, in one of your pockets or in your wallet, not in your sock or shoe.
- Discard envelope
- Return to the Lab (where you started)
- Remember you must not return any earlier than 20 minutes after you left.

## **Appendix K: Video Watching Instructions—Deceptive (\$1.00)**

By now you should have watched the informed consent form, and signed the consent form.

This packet contains all of the materials and directions that you need to complete this experiment. Once you have opened this packet, you will not be able to ask questions regarding the condition you have been assigned to or the experiment, until the polygraph exam is completed and you meet with the original research assistant again.

Please follow the directions carefully.

1. Open this packet.
2. Remove all materials.
3. Insert the video labeled “Tape A” into the VCR and press Play.
4. Watch the video.
5. Push Stop and then Rewind.
6. Eject when the video is finished rewinding.
7. Place the video back in its container and then back on the table in front of you.
8. Collect everything that you need to complete your mission and put the rest of the materials (if any) back in the packet and leave it on the table while you complete your mission.
9. After you return you will be given a polygraph examination.
10. After the polygraph examination is completed, you meet again with the original research assistant.
11. The research assistant will ask you questions about your polygraph examination, the condition you were assigned to, and a few other questions for data collection purposes. You should answer all of the questions honestly.
12. The research assistant will pay you with a check for the total amount you qualify for.

Thank you again for your participation.

## **Appendix L: Script for Video in OIQ Study—Instructions for Deceptive Subjects (\$1.00)**

By now you have agreed to be a participant in this study, and have signed the Informed Consent Form.

As stated in the previous videotape, there are several conditions in this study. This videotape will tell you about your role in the experiment.

Your assignment to be either a truth teller or a deceiver was made on a random basis by one of the scientists conducting this study. A copy of this video was placed on this table yesterday by that scientist.

**Neither the research assistant who gave you this packet nor the polygraph examiner, know whether you will be telling the truth or lying on the polygraph examination.**

You have been selected to be in the deceptive condition. Furthermore, if there was a second videotape in the envelope you will also be asked to complete a second theft of some money.

Please listen to these instructions carefully and make sure that you understand exactly what you are to do. Replay this tape if necessary. You may make a few notes to help you remember what to do as you carry out these instructions.

There are writing materials, along with a written (text) version of this entire process, provided in the packet that you have been given. This is a polygraph or lie detection experiment. Because you are in the deceptive condition, you will steal one dollar. You will then be given a polygraph examination. If you can beat the polygraph by appearing innocent on that test, you will be paid a bonus of one dollar in addition to the amount that you will be paid for participating in the experiment.

Your mission, if you choose to accept it, is as follows: You will go to room 620 of the Education Building and remove the envelope from the door. That envelope is addressed to Sam Stone. You will verify its contents. Take the contents out of the envelope and conceal it on your person. You can hide it in your wallet or in any of your pockets, but do not put it in your shoe or in your sock. Tear the envelope up and dispose of it in any trash can.

**If you are found innocent on the polygraph examination, you will be paid an amount equal to that which you stole.** However, you must return the money from the envelope when the polygraph examination is completed. Be careful not to leave any fingerprints, and be sure to dispose of the envelope where it will not be found. It is extremely important that you steal the money without alerting anyone to the theft. For example, since room 620 is a faculty office, be sure to have your alibi ready in case someone asks you what you are doing. **You are not, and I repeat, not to tell anyone that you are participating in an experiment. YOU DO NOT WANT TO GET CAUGHT COMMITTING THIS CRIME,** so be prepared to do this mission in a discrete fashion.

Before you leave this room, check the time. You have 20 minutes to complete your theft once you leave. Do not return early. If you finish early, wait until the 20 minutes are up, and then return to the room you are in now, and wait until an experimenter comes for you.

You will then be given a polygraph test by a polygraph examiner. She will be testing you about the theft of a one-dollar bill. She will not know if you are innocent or guilty of the theft

because half of the subjects in the experiment have not committed the theft. This means that she will have to make her decision entirely on the basis of the polygraph test.

**You will receive the dollar bonus only if the examiner finds you innocent. So you must actually convince the examiner that you are innocent. If she decides when the examination is over that you are guilty or she cannot decide whether you are guilty or innocent, you will not receive the bonus.**

Also, you must not make her suspicious when she is interviewing you during the initial portion of the test. The innocent subjects in this experiment do not know any details of the theft such as the room number or what is in the envelope. They know only that the deceptive subjects have stolen some money. They do not know anything else. You could easily give yourself away by accidentally revealing any other details, so please maintain your innocence wisely.

**So, when the polygraph examiner asks you questions about any other details about the theft, you must not only deny knowing anything other than that, but you must do so sincerely so that she does not become suspicious. If at some point during the test you think you blew it, do not give up. You may still be able to beat the test, but if you confess, you will not even be eligible to receive the money that is paid for passing the polygraph examination.**

Those are your instructions. **You must follow those instructions exactly if you are to be eligible for the pay and for the bonus.** If you do not wish to participate in this experiment, please inform anyone in Room 5 (across the hall). If you are not entirely sure of what you are to do, push the stop button and rewind the tape by pushing the rewind button. Then push the play button to hear the instructions again. When you are done, push the stop button.

If you are directed to watch another video, please do so now.

PLEASE NOTE THAT YOU WILL BE COMMITTING THE CRIME DESCRIBED IN THIS VIDEOTAPE AS WELL AS WHATEVER IS CONTAINED ON THE SECOND TAPE IF YOU HAPPEN TO BE A SUBJECT THAT HAS INSTRUCTIONS TO VIEW THE SECOND VIDEO.

**Once you leave this room, you should return in exactly 20 minutes, not sooner, and not later. That is it. Good luck with the examination.**

### **Appendix M: Directions for Deceptive Subjects--\$1.00**

- Leave the Lab from the back door (the wooden ramp)
- Cross the street to the blue flashing light, number 16
- Facing the light you want to turn left
- Follow the side walk, until you reach the Science Nursing sign
- At the sign go right diagonally to the row of four doors, next to the telephone.
- As you enter the building (which is the Education building) go to the right of the Directory sign to the elevators.
- Select the up button
- Go to the 6<sup>th</sup> floor
- As you exit the elevator on the 6<sup>th</sup> floor proceed down the hall towards room #636
- Take a right at room #636
- Walk down the hall
- At the end of the hall take a left
- Walk down to room #620
- Remove the envelope on the door
- Verify the contents
- Place the money on your person, in your one of your pockets or in your wallet, not in your sock or shoe.
- Discard envelope.
- Return to the Lab (where you started)

Remember you must not return any earlier than 20 minutes after you left.

## **Appendix N: Video Watching Instructions--Deceptive (\$21.00)**

By now you should have watched the informed consent form, and signed the consent form. This packet contains all of the materials and directions that you need to complete this experiment. Once you have opened this packet, you will not be able to ask questions regarding the condition you have been assigned to or the experiment, until the polygraph exam is completed and you meet with the original research assistant again.

Please follow the directions carefully.

1. Open this packet.
2. Remove all materials.
3. Insert the video labeled "Tape A" into the VCR and press Play.
4. Watch the video.
5. Push Stop and then Rewind.
6. Eject when the video is finished rewinding.
7. Insert the video labeled "Tape B" into the VCR and press Play.
8. Watch the video.
9. Push Stop and then Rewind.
10. Eject when the video is finished rewinding.
11. Place the video back in its container and then back on the table in front of you.
12. Collect everything that you need to complete your mission and put the rest of the materials (if any) back in the packet and leave it on the table while you complete your mission.
13. After you return you will be given a polygraph examination.
14. After the polygraph examination is completed, you meet again with the original research assistant.
15. The research assistant will ask you questions about your polygraph examination, the condition you were assigned to, and a few other questions for data collection purposes. You should answer all of the questions honestly.
16. The research assistant will pay you with a check for the total amount you qualify for.

### **Appendix O: Directions for Deceptive Subjects--\$21.00**

- Leave the Lab from the back door (the wooden ramp)
- Cross the street to the blue flashing light, number 16
- Facing the light you want to turn left
- Follow the side walk, until you reach the Science Nursing sign
- At the sign go right diagonally to the row of four doors, next to the telephone.
- As you enter the building (which is the Education building) go to the right of the Directory sign to the elevators.
- Select the up button
- Go to the 6<sup>th</sup> floor
- As you exit the elevator on the 6th floor proceed down the hall towards room #636
- Take a right at room #636
- Walk down the hall
- At the end of the hall take a left
- Walk down to room #620
- Remove the envelope from the door
- Verify the contents
- There should be a Dollar bill \$1.00
- Place the money on your person, in your one of your pockets or in your wallet, not in your sock or shoe.
- Turn around face room 640 enter room
- Say to the student at the table:  
"Hi. I am the treasurer for Psychology Club and I need to pick up Jenny Wilkenson's membership dues from the filing cabinet." If no one is in the study room, remove the envelope from the cabinet yourself.
- Take envelope out of top drawer of file cabinet.
- Verify contents
- There should be a twenty dollar bill (\$20.00)
- Discard both envelopes.
- Place the money on your person, in one of your pockets or your wallet, not in your sock or shoe.
- Return to the Lab (where you started)
- Remember you must not return any earlier than 20 minutes after you left.

**Appendix P: OIQ Study General Information Sheet**

Subject Number \_\_\_\_\_

Age \_\_\_\_\_

DOB \_\_\_\_\_

General Health \_\_\_\_\_ MD Care Now? \_\_\_\_\_

How feeling today? \_\_\_\_\_

Hospital last 2 years? \_\_\_\_\_

Any trouble with Heart or BP? \_\_\_\_\_

Currently taking any Rx? \_\_\_\_\_

Any medicine, drugs, or alcohol during last 8 hrs? (List) \_\_\_\_\_

Ever under care of Psychiatrist or Clinical Psychologist or in Mental Hospital? \_\_\_\_\_

How well did you sleep last night? # hours? \_\_\_\_\_ More or less than normal? \_\_\_\_\_

Have you ever had a polygraph test before? \_\_\_\_\_

What is your education? \_\_\_\_\_

Have you had any other specialized training? \_\_\_\_\_

How are you presently employed? \_\_\_\_\_

Notes on the Exam \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Appendix Q: Informed Consent Form—Administered by Polygraph Examiner**

**POLYGRAPH EXAMINATION STATEMENT OF CONSENT**

Place: Boise State University      Date: \_\_\_\_\_      Time: \_\_\_\_\_

Statement of Consent of: \_\_\_\_\_

The polygraph examiner, \_\_\_\_\_, has explained the nature of the polygraph examination and told me that I cannot be required to take such examination without my consent. I was further advised that the examination room is equipped with a video camera and that the examination will be videotape recorded. I have been advised that the results of this examination will be kept confidential. Understanding my unqualified right to refuse, I, \_\_\_\_\_, do hereby, this date, voluntarily and without duress, coercion, or unlawful inducement, consent to a polygraph examination concerning the theft of an envelope containing \$1 from the Education Building.

Signature of Examinee \_\_\_\_\_

Signature of Examiner \_\_\_\_\_

## **Appendix R: NOOIQ Question List – For Use in Pretest Review**

Examiner: \_\_\_\_\_ Subject #: \_\_\_\_\_

Date: \_\_\_\_\_

**R1 Did you steal the missing envelope?**

**R2 Did you steal that envelope from the door of Room 620 in the Education Building?**

**R3 Do you know where that missing envelope is now?**

**SR Regarding the envelope that was stolen from the Education Building, do you intend to answer truthfully each question about it?**

**C1 Prior to 1998, did you ever steal anything from someone who trusted you?**

**C2 Prior to 1998, did you ever do anything that was dishonest or illegal?**

**C3 Prior to 1998, did you ever lie to a person in a position of authority?**

**N1 Are we in the State of Idaho?**

**N2 Are the lights on in this room?**

**N3 Are you currently sitting in a chair?**

**Examiner: Please use space below (and back of page) to write any notes regarding any concerns/questions the subject had, or any admissions of guilt during the pretest interview.**

## **Appendix S: OIQ Question List – For Use in Pretest Review**

Examiner: \_\_\_\_\_ Subject #: \_\_\_\_\_

Date: \_\_\_\_\_

**R1 Did you steal the missing envelope?**

**R2 Did you steal that envelope from the door of Room 620 in the Education Building?**

**R3 Do you know where that missing envelope is now?**

**SR Regarding the envelope that was stolen from the Education Building, do you intend to answer truthfully each question about it?**

**C1 Prior to 1998, did you ever steal anything from someone who trusted you?**

**C2 Prior to 1998, did you ever do anything that was dishonest or illegal?**

**C3 Prior to 1998, did you ever lie to a person in a position of authority?**

**N1 Are we in the State of Idaho?**

**N2 Are the lights on in this room?**

**OI1 Do you believe I will only ask you the questions we reviewed?**

**OI2 Is there something else you are afraid I will ask you a question about?**

**Examiner: Please use the space below (and back of page) to write any notes regarding concerns/questions the subject had, or any admissions of guilt during the pretest interview**

## Appendix T: Debriefing Form

Participant # \_\_\_\_\_

Thank you for participating in our research. The general purpose of this study is to determine how different levels of theft influence results of polygraph outcomes in deceptive and innocent conditions. There are four possible conditions you could have been a part of: the innocent where no money was stolen, where you stole one dollar, where you stole twenty dollars, or where you stole twenty-one dollars. If you were part of any of the theft groups you were required to lie about stealing the money. If you were in the innocent group you told the truth for all the questions. The overall rating of truthfulness will determine the possibility of receiving the bonus. Before you leave, I will be able to give you a check for the total amount you qualify for.

Now, I need to know which condition you participated in.

Which group were you in?

Innocent

One-dollar

Twenty-dollar

Twenty-one dollar

Research Assistant: Verify the condition that the subject participated in.

Correct

Incorrect

(If they were in either the twenty dollar or the twenty-one dollar group, did they interact with anyone in the study room?)    Yes    No

5. How old are you? \_\_\_\_\_

6. What is your highest degree of education (complete grade)? (Circle One)

College – First-semester Freshman   Freshman   Sophomore   Junior   Senior

7. What is your occupation? \_\_\_\_\_

8. Gender (Circle One – do not need to ask)

Male   Female

Countermeasures Debriefing

Participant # \_\_\_\_\_

Did you use any countermeasure during your examination? (To clarify: Did you do anything during your examination to make yourself seem more truthful?)

Where did you learn how to use that technique?

Once again thank you for your participation in our project if you have any further questions please call Dr. Honts at 426-7754 or Dr. Amato at 426-4445.